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# Conference Proceedings of the FirstMile.US Fall 2005 Conference


## FirstMile.US Fall 2005
## September 14, 2005
## L'Enfant Plaza Hotel
## Washington DC

# FirstMile.US Fall 2005 Conference Proceedings

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September 15, 2005

Broadband Daily
News & Analysis

**Cerf Predicts Rising Use Of Geographic Information Via Broadband**
By Paul Dykewicz

A key application for mobile users that seems destined to rise is information about the geographic location of device users or their intended destinations, said Internet pioneer Vinton "Vint" Cerf, who announced earlier this month that he would leave his technology leadership post at MCI to become Google's chief Internet evangelist.

Mobile devices are enabling Internet applications and the use of geographic information is destined to find a niche, Cerf said. Cerf, who co-designed the TCP/IP protocols that were used to develop the Internet's underlying architecture, offered his forecast during an interview following his formal remarks as a keynote speaker Wednesday at a day-long Internet conference in Washington, D.C., sponsored by FirstMile.US, an advocacy group that supports the development of improved broadband services in the United States.

The users of mobile broadband devices would be able to find the nearest hospital, ATM or bank, Cerf said. He described the application as "geo-indexing" and predicted that it would have many practical uses in the future.

Cerf also predicted that consumers increasingly would not require real-time applications, despite forecasters who believe the opposite. The increasing popularity of TiVo and other video recording services show that people are enjoying the opportunity to download broadband content and watch it when they want rather than when it is aired in real-time, he explained during his presentation.

"Only breaking news and maybe sports need to be broadcasted in real-time," Cerf said. As long as the capacity for downloading content is available, most of the requirements of consumers will be met without real-time viewing, he added.

One delivery mechanism of multicasting that should gain increased use is satellite radio, Cerf said. "Satellite is more likely to be the medium for IP multicasting than terrestrial radio," predicted Cerf, who added that he was not too optimistic about wireless-based IP broadcasts.

Upon officially joining Google Oct. 3, Cerf said that he expects to fulfill as role as a technology "bumble bee" who would visit the company's laboratories and intellectually challenge employees to solve problems in hopes of developing new applications. There is no lack of ideas, added Cerf, who said he did not expect to be given responsibility for directly managing any engineers.

"Google has done a remarkable job of marketing its services for the network," Cerf said. His role would involve getting into the details of the company's technology developments and looking for ways to add value to the process, he explained. Among the areas that Cerf said he might probe are Google's design philosophies, as well as its technology parameters and assumptions.

One specific area of interest for Cerf is voice-enabled technologies, he said.

"Today's Google searches would not work well in a spoken environment," Cerf said. "There are places in the world where people are not literate but they can speak."

Google CEO Eric Schmidt, who has known Cerf for roughly 20 years, described him as a technology visionary when the company announced on Sept. 8 that he would be joining it. Cerf will help Google build network infrastructure, architectures, systems and standards for the next generation of Internet applications, according to the announcement.

At MCI, Cerf led the company's technology advancements since 1982, with a break to return to research at the Corporation for National Research Initiatives from 1986 to 1994. Upon returning to MCI during 1994, he helped to guide the company's Internet initiatives. With Robert Kahn, Cerf recently received the ACM's A.M. Turing Award, which is described in Google's announcement as the "Nobel Prize for computing." Cerf also is working on the Interplanetary Network, a project of NASA's Jet Propulsion Lab, which intends to extend the Internet into outer space for planet-to-planet communications.

September 16, 2005

Broadband Daily
News & Analysis

**Killer App Still Eludes Broadband Industry**
By Paul Dykewicz

The elusive search for a killer application that would propel the broadband industry forward sparked lively discussions about delivering entertainment, educational content, and healthcare information, but no answers, during the one-day conference held Sept. 14 in Washington, D.C. by advocacy group FirstMile.US.

No single application has attracted an overwhelming demand from the marketplace. However, private sector entrepreneurs and public sector officials alike are rolling out new applications aggressively to seize upon the enhanced capabilities offered by high-speed broadband.

Entertainment content increasingly aimed at technology-savvy youth is finding the Internet to be a viable substitute for carriage on traditional television. In some cases, entertainment content can be offered on the Internet as a core delivery method that is supplemented when it is aired on local or national television channels.

Dave Yanofsky, director of programming at UthTV, of Redwood City, Calif., said his organization has turned to broadband as the primary distribution outlet for its youth-oriented programming. However, it also has aired 12 shows on the UPN channel in San Francisco and is trying to take its distribution national.

Young people are adopting and using digital media tools as a "new language," he added.

"The reality is the distinction between TV and computers is blurring," Yanofsky said. "Youth spend more time using computers than watching television."

Broadband also allows the cost-effective online collaboration with other members of a creative team who may be spread around the world, said Jeff Fino, co-founder of Wild Brain, a San Francisco-based animation studio that develops and produces content for the global film, TV, commercials and interactive markets.

"Our biggest client for wireless broadband is Japan," Fino said. The proliferation of cell phones in Japan has developed an enormous market for mobile broadband content to become a killer application there, he added.

"Young people are the ultimate broadband consumers, users and hackers," Ken Ikeda, executive director of Youth Sounds, an Oakland, Calif.-based media and arts organization that provides youth with opportunities to share their stories through programs in video, audio and music production. "Young people are adept at technology and they have it in their hands."

For young people, broadband viewing is just as "legitimate" as television, Ikeda said. In the San Francisco Bay area, there are plenty of computers and broadband access, even in poor areas, he added.

Barrett Fox, another speaker on the conference's entertainment panel, is a character animator who has worked in developing video games and twice has served as the technical director of startups.

"There is a lot of movement going on in the use of video games for education," Fox said. Rich content delivered with high-speed broadband can show quality video similar to what one might expect from a movie, he added.

ESPN, for example, is working to put animated versions of its own announcers in video games to let them "broadcast live," Fox said.

"Video will be the new document," said Joaquin Alvarado, a faculty member at San Francisco State University, who moderated the conference's panel discussion about entertainment. "People will need to be able to deal with it and interact with it."

The Internet will be delivered by a wide variety of means and go to places where people may not have access to broadband, said Internet pioneer Vinton "Vint" Cerf, another speaker at the event who is leaving his technology post with MCI to join Google as chief Internet evangelist.

"Be careful not to only design applications with broadband quality," Cerf said during an interview after his keynote address. "Build systems that are open sourced at a wide range of speeds."

As far as reaching young people, the new generation expects to have more control of the entertainment content that they use, Cerf said. In the past, a movie was not stopped until it finished airing in real-time but recorded media now allows video to be watched when a user wants, he added.

Education uses of broadband also are on the ascent but not taking flight as quickly as profit-generating entertainment content.

"In higher education, big broadband is not an option, it is an imperative," said Steve Corbato, director of network initiatives and managing director of technology direction and development at Provo, Utah-based Internet2, a consortium led by 207 universities that works with industry and government to develop and to deploy advanced network applications and technologies. Indeed, many potential science applications require that the Internet work three or four times faster, he added.

One problem in developing education applications is money. Speakers on the education panel highlighted successful uses of broadband to aid education that included examples in New York, Ohio and Virginia, but none of those initiatives could be described as a killer application.

Steve Brand, chief imagination officer at One Cleveland, said his organization obtained donated fiber in a 17-county area of northeastern Ohio that is used to send broadband content from museums, art institutes and the world-renowned Cleveland Clinic. One Cleveland has received cooperation from local cable companies and is in the process of trying to develop the same supportive relationship with the regional telephone company, he added.

Healthcare also offers another avenue for using broadband to good advantage but it presents an additional cost when efforts are on the rise to slow spending rather than increase it.

Another impediment is that real-time telemedicine requires "symmetrical broadband," said Michael Ackerman, a presenter on the healthcare panel who is an assistant director at the National Library of Medicine in Bethesda, Md. Existing real-time applications include teaching human anatomy and surgery, as well as showing the condition of a patient to a doctor in a faraway location to assist with medical care.

Broadband can be used to aid with the delivery of medical assistance to injured soldiers in war zones, said Gary Gilbert, another member of the healthcare panel who also is chief of the knowledge engineering group at the Ft. Detrick, Md.-based Telemedicine & Advanced Technology Research Center (TATRC), a division of the U.S. Army Medical Research and Materiel Command. Such applications are expected to expand in the future as technology allows, he added.

Bio-defense distance learning is a major area of interest, said Conrad Clyburn, special assistant to the director at TATRC. Broadband is used to integrate partnerships between academia, industry and government, he added.

Medical procedures require ubiquitous, high-quality broadband service, Clyburn said. Simulated surgeries have been performed via broadband, he added.

# An Introduction to FirstMile.US
Susan Estrada, FirstMile.US

firstmile.us
big broadband everywhere

## An Introduction to FirstMile.US

Susan Estrada, President
susan@firstmile.us

## The First Mile Philosophy

- Titus Moetsabi, an African, developed the idea of communities as being at the first mile of connectivity.
  - Connect yourself to the rest of the world and all it has to offer.

## The time has come for action

shouldn't your children receive the best education possible— no matter where you live or how much money you have?

sick and tired of watching our nation lose the broadband race?

shouldn't EVERYONE have access to the latest in e-healthcare— something that could lower costs?

why can't YOU choose where and how you get your information and entertainment?

## Our Mission and Vision

- Mission: To educate, advocate and focus the debate on the power and promise of big broadband in the United States
- Vision: Every member of the American public has access to big broadband, the 21st century pathway to a better overall quality of life

## The Dichotomy of Agendas

- Everyone believes
- But, everyone has their own agenda
- Find the common points in the agendas and make forward progress

Subcommittee by Tony Cragg

# An Introduction to FirstMile.US
Susan Estrada, FirstMile.US

## Big Broadband? What's that?

- There are variety of broadband connection characteristics that allow great strides in the types of applications used.
  - size of the bandwidth
  - latency (bottlenecks)
  - symmetry (same bw in both directions)
- It's a sliding scale based on time.
  - Most experts agree that we need at least 100 megabits of broadband bandwidth to support the kind of applications we expect in the next five years. Some have even suggested that one gigabit of bandwidth is essential by 2010.
- *Fact: usability studies show a goal of 300 ms response time for any application but no longer than 1 second.*

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## Primary objectives and purposes of FirstMile.US

- Building market demand for big broadband services
  - Building public awareness of the importance of big broadband
  - Catalyzing a grass-roots legion of big broadband evangelists nationwide

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## How are we going to build demand?

- Provide electronic communications via the web to support online collaboration tools such as discussion blogs, resource listings and event locations
- Host face to face meetings, conferences, seminars and workshops to educate the general public on big broadband
- Provide briefings to help policymakers understand the impact of their policies on the deployment of big broadband
- Build online toolkits for advocacy, community readiness, and others as needed
- Engage in other activities related to educating the public about big broadband issues and concerns

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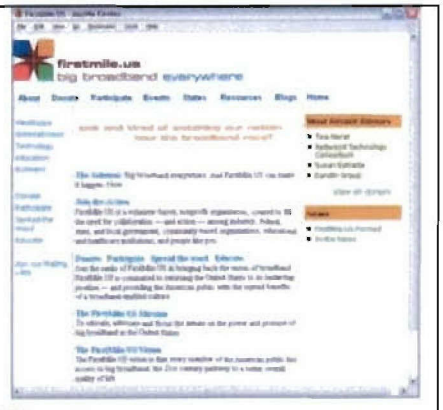
**FirstMile.US has adopted a Web-based outreach strategy organized by state and our focal areas of healthcare, entertainment, technology, education and business.**

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## Big Broadband Bill of Rights

- A discussion document meant to help people understand the components of broadband
  - Pipes
  - Applications
  - Devices
  - Policymakers

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## Planned Activities

- Public Awareness Toolkit
  - Simple, easy-to-understand strategies for explaining the value of big broadband to every member of the American public
- Community Building Toolkit
  - "How To" guides to create a first mile vision in your community
- Top 50 Contests
  - Feature top 60-second videos that embody our big broadband vision

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# An Introduction to FirstMile.US
Susan Estrada, FirstMile.US

## Sources of Funding

- **Founding Circle Drive – Ends December 1**
  - The Founding Circle Drive has key volunteers raise funds through corporate and individual contributors. Partners and donors are recognized in numerous ways for the valuable role they play in the organization. We anticipate the drive will cover the start-up expenses.
- **Partner Program - Ongoing**
  - FirstMile.US Partners stand out from the crowd – and show the world that they are visionaries in the big broadband world. Any organization or individual that wants to demonstrate their commitment to the goals of FirstMile.US is encouraged to become our Partner.
  - Becoming a FirstMile.US Partner makes it easy to give and participate at the same level as your colleagues.
- **Grants - Ongoing**
  - FirstMile.US is pursuing grant opportunities to fund targeted projects as well as the planned activities listed earlier.

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## Organization

- California public benefit organization
  - Currently working on 501c3 paperwork
- Volunteer-based
- Board of Directors
  - Comprised of a group of individuals with deep broadband beliefs
  - Jim Baller
  - Steve Corbató
  - Susan Estrada
  - Dewayne Hendricks
  - Lynn St.Amour
- Staff
  - Currently volunteer
  - Susan Estrada, President
  - Concordia Chen, Webmaster
  - Julie Van Fleet, Government Relations

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## Next Steps

- Donate
  - Invest in the future of big broadband by investing in FirstMile.US
- Participate
  - Blogs, events, resources, mailing list, web
- Spread the Word
  - Tell others about FirstMile.US and big broadband
- Educate
  - Create a First Mile vision in your community

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**Is Entertainment the Killer App?**

The first session of the day was the entertainment panel. The panel was moderated by Joaquin Alvarado, from the Institute for Next Generation Internet at SFSU [*http://www.ingi.org*]. Panelists included Jeff Fino, co-founder, WildBrain; Barrett Fox, Animator, BarrettFox.com; Ken Ikeda, Executive Director, Youth Sounds; Dave Yanovsky, Executive Producer, UthTV.

Wild Brain, Inc. [*http://www.wildbrain.com*] is an award-winning animation studio that develops and produces content for the global film, TV, commercials, and interactive markets by using pioneering digital technology along with traditional artistry.

Youth Sounds [*http://www.youthsounds.org*] is a nationally recognized media and arts organization dedicated to providing youth with opportunities to share their stories through programs in video, audio and music production. Founded in the Fall of 2001 by Ken Ikeda, Youth Sounds began as an after-school drop-in program at McClymonds High School in Oakland, CA. Since then it has worked with thousands of youth in Bay Area high schools and public housing sites nationally. Their programs range from introductory lessons in storytelling and production to advanced and professional employment. They are committed to providing a comprehensive experience for our youth, from idea- to product- to marketing and distribution. Youth can transform themselves and the world through the work they've produced.

UthTV [*http://www.uthtv.com*] is an outlet for the next generation of storytellers. UthTV empowers teens to become media producers. With digital video cameras and editing software so accessible, talented young filmmakers can now be found in every corner of the country. But instead of having only a handful of people see their work at a school assembly, youth film festival, or in their families' living room, Uth TV can air the piece on a UPN station and reach hundreds of thousands of teenage viewers. Originally slated to be a cable channel, UthTV has found its niche as an online broadcast medium and has found it to be much more cost effective than a cable channel.

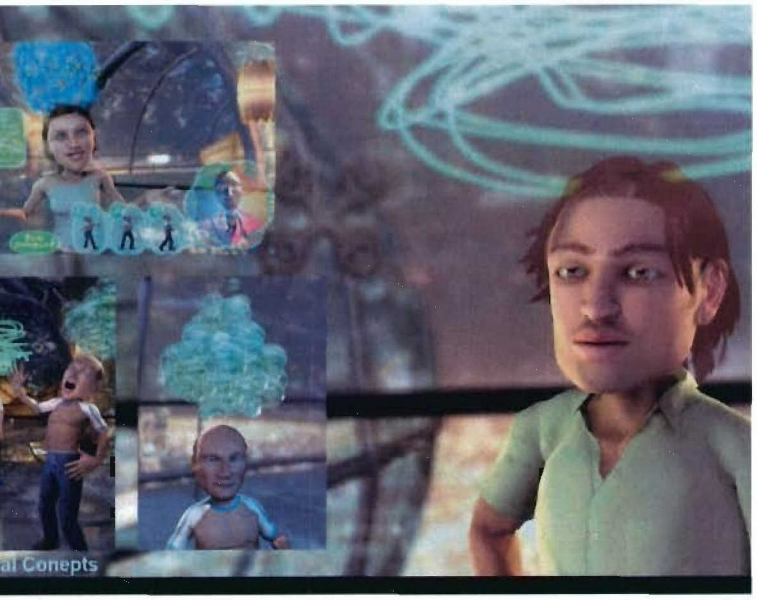
Barrett Fox [*http://www.barrettfox.com*] is an animator who has worked on video games. He is currently involved with the Brainstormer Project, an educational tool built on an existing video game engines. [*http://www.barrettfox.com/Brainstormer_Project.pdf*]. The application allows users to create characters with auras that allow for idea sharing. The project can be used for collaboration, Distance Education and Distance Production. For more information, contact fox@barrettfox.com
Fox mentioned an event for those interested in serious game development called The Serious Games Summit [*http://www.seriousgamessummit.com/home.html*]. The Summit will be held in Washington, DC October 31-November 1, 2005. The Serious Games Summit is a unique, two-day event that provides:

- Developer training and education specific to serious game creation
- 40+ dynamic sessions, lectures and roundtables discussions
- Showcase of next-generation serious games efforts

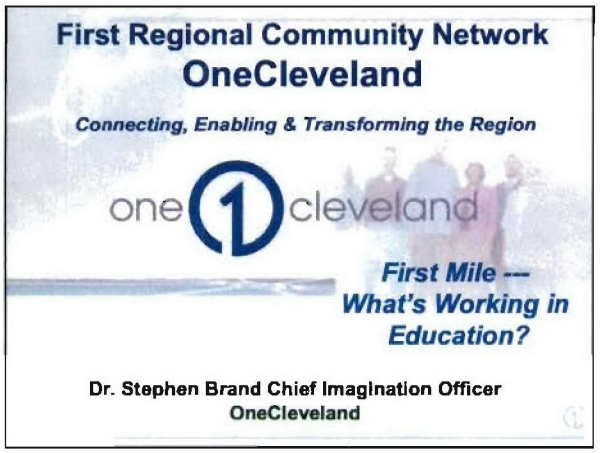
It will explore and demonstrate how games are being used in all industries – education, government, healthcare, military, corporate, first responders, science.

Brainstormers Think Tank Project
Barrett Fox
http://www.barrettfox.com/Brainstormer_Project.pdf

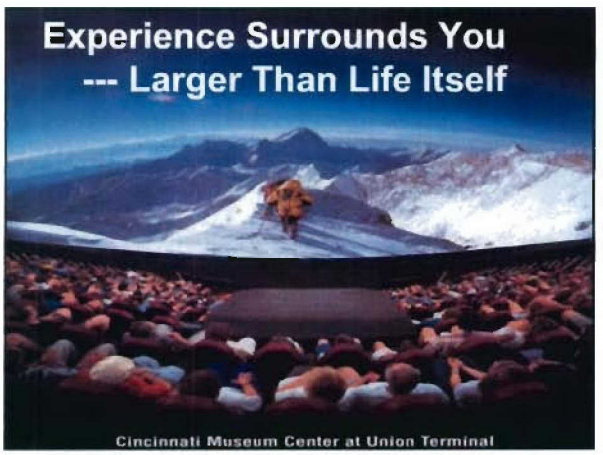




# First Regional Community Network – OneCleveland
## Steven Brand, OneCleveland










# First Regional Community Network – OneCleveland
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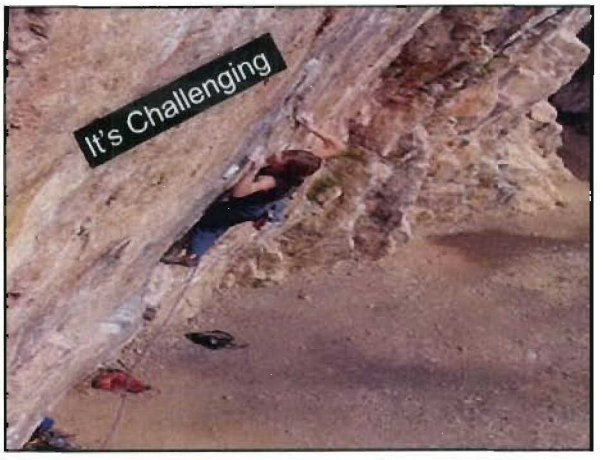
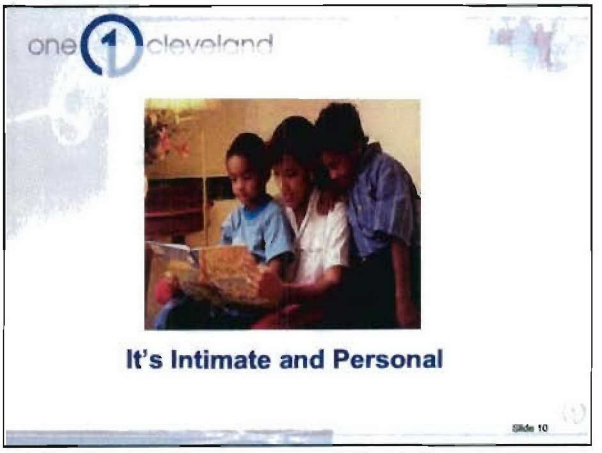
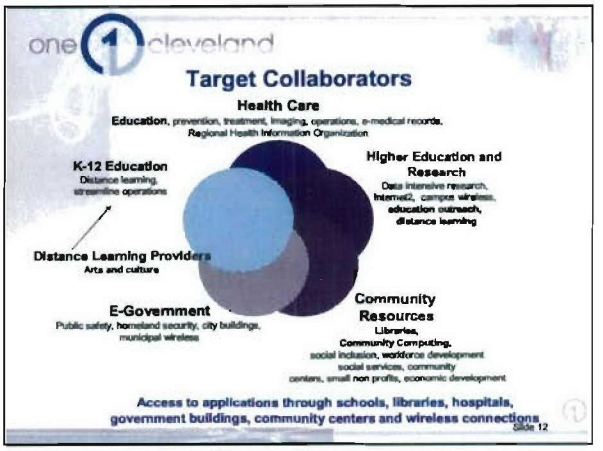




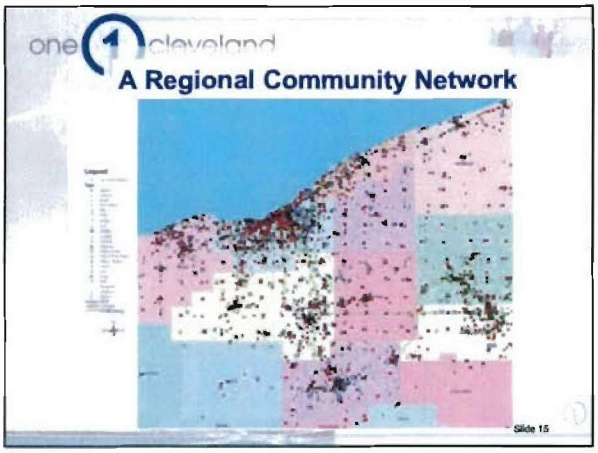







Killer App???
one cleveland


Killer App
one cleveland
The Community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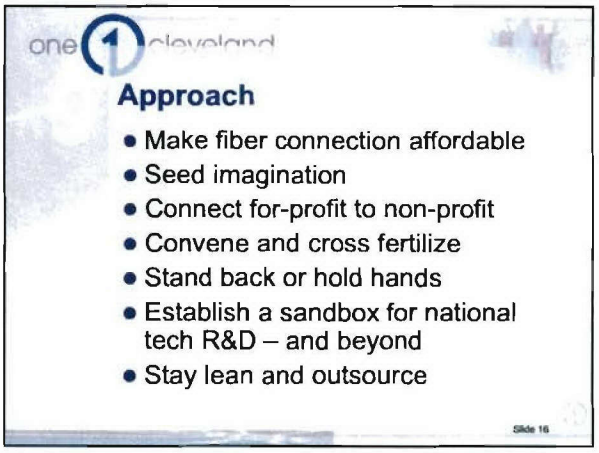
A Regional Community Network
Slide 15


one cleveland
Approach
Make fiber connection affordable
Seed imagination
Connect for-profit to non-profit
Convene and cross fertilize
Stand back or hold hands
Establish a sandbox for national tech R&D – and beyond
Stay lean and outsource
Slide 16


one cleveland
Signed Subscribers (as of 7/1/05)
What's the Opportunity?
CASE
Cleveland Municipal School District
THE CLEVELAND CLINIC
THE CLEVELAND ORCHESTRA
ideastream
CIA
The MetroHealth System
Greater Cleveland Regional Transit Authority
Myers University
cim
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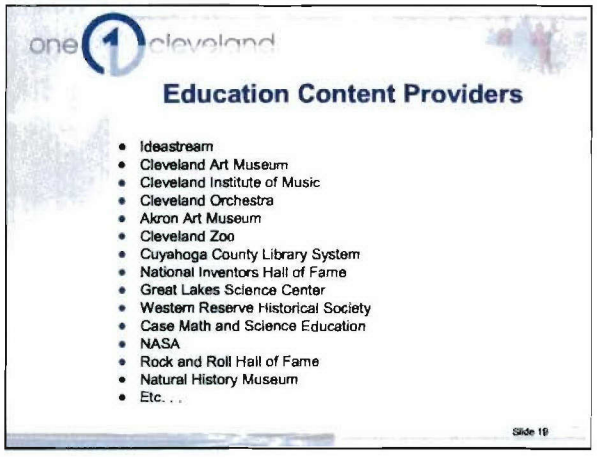
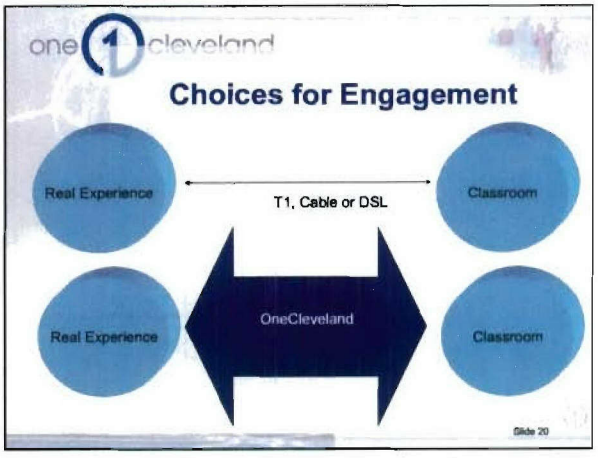
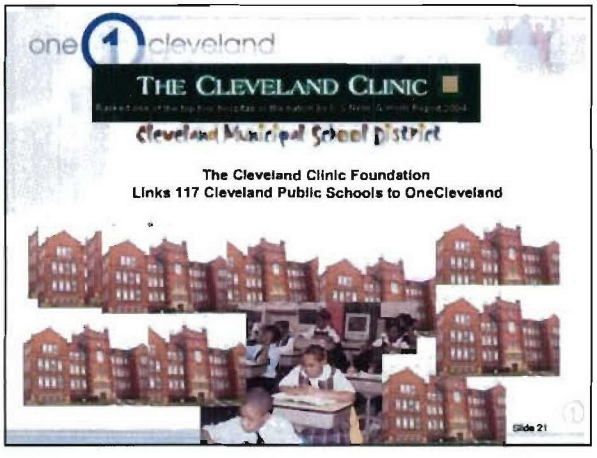
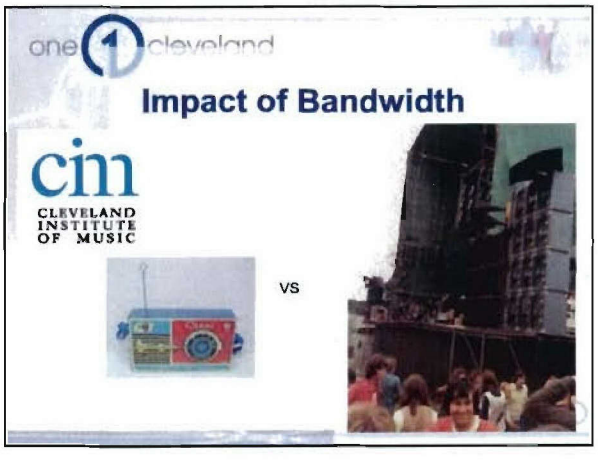
one cleveland
Strategic Partners
FirstEnergy
Cisco Systems
TIME WARNER CABLE
intel
Adelphia
Sun
Cavalier
IBM
TFN
OHIO LIGHTS THE WAY
Slide 18

# First Regional Community Network – OneCleveland
## Steven Brand, OneCleveland





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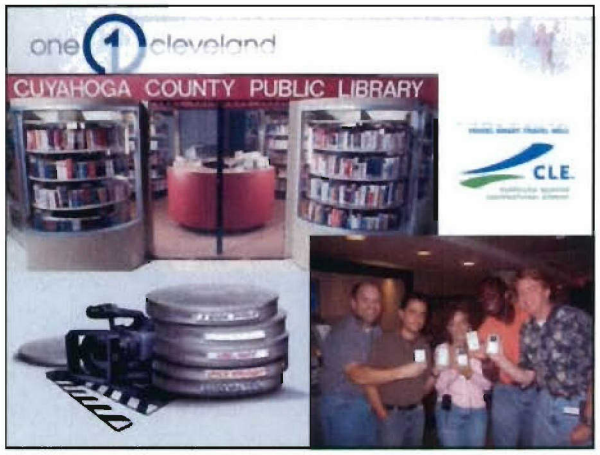
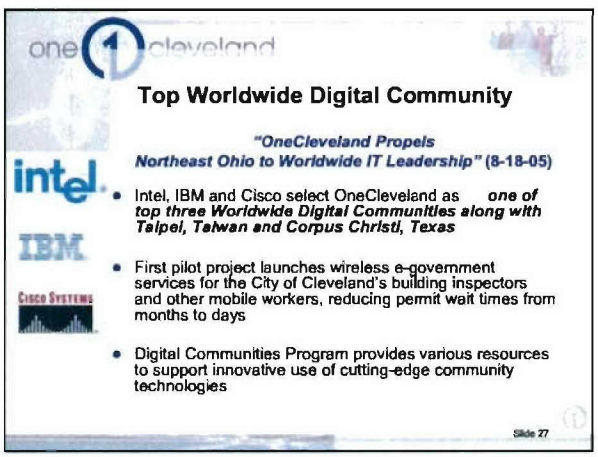




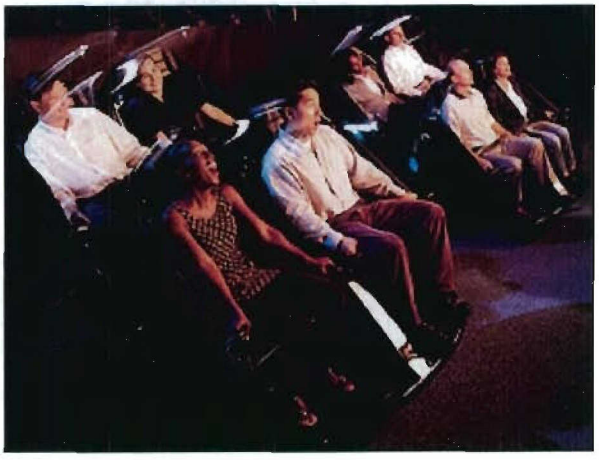




Creating Memorable Learning Experiences

The Challenge

# First Regional Community Network – OneCleveland
## Steven Brand, OneCleveland




# Big Pipes, Emptying Pipes
## Tim Lance, NYSERNet

Big Pipes, Emptying Pipelines

FirstMile.US Fall Conference
September 14, 2005

Tim Lance, NYSERNet

A prime $p$ is said to be regular

$\iff$ the ring of Gaussian integers mod $p$ has the unique factorization property

$\iff$ $p$ does not divide the numerator of any Bernoulli number $B_n$

The Bernoulli numbers are defined by the series

$$\frac{x}{e^x - 1} = 1 - \frac{x}{2} + \frac{B_1}{2!}x^2 - \frac{B_2}{4!}x^4 + \frac{B_3}{6!}x^6 + \cdots$$

A prime is irregular if it is not regular. The smallest irregular prime is 37 which divides the numerator of $B_{32}$.

2

## A little bit about NYSERNet

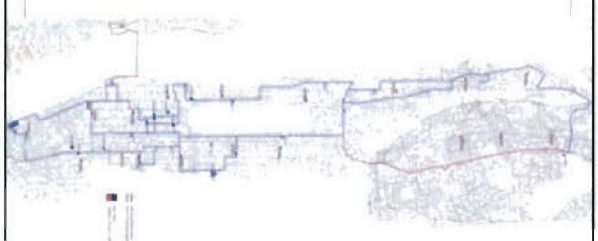
NYSERNet is. . .
- the research and education network in New York State
- the Internet2 gigaPoP in NY
- a 501(c)3 not-for-profit
- a membership organization
- financially self-supporting
- long-lived (since 1985)
- dedicated to the R&E community (no commercial customers)

NYSERNet is not. . .
- large (staff of 14)
- a state agency
- an ISP (we resell commercial ISP service)
- a carrier or CLEC

3

New York City
Dark Fiber Project

## Manhattan Dark Fiber



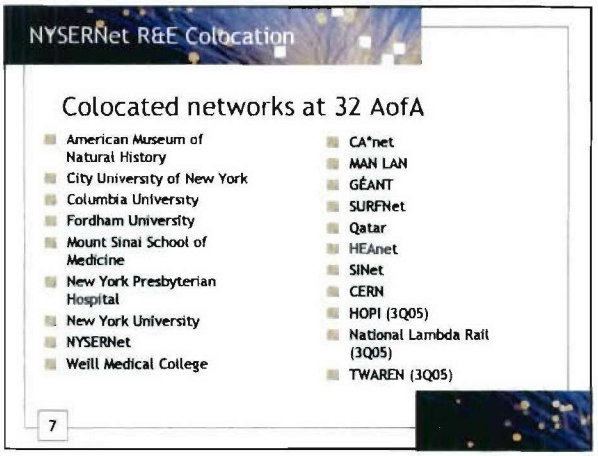
22 sites – 1,528 miles of fiber. . .

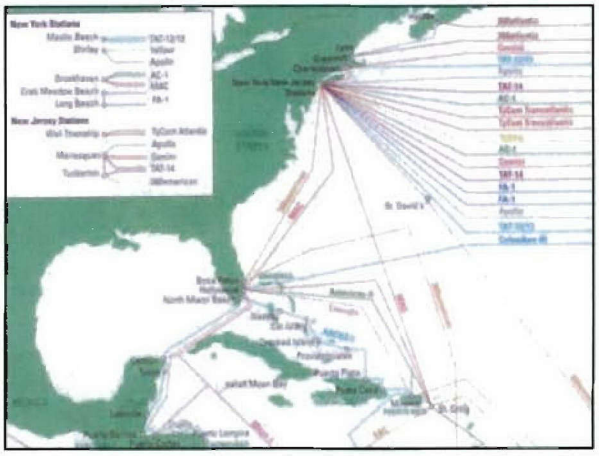
5

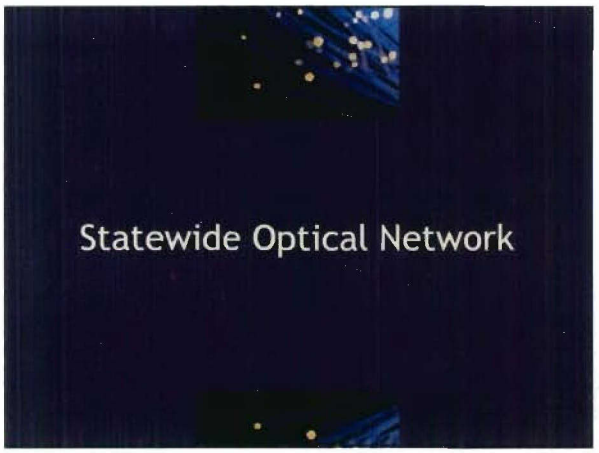
Colocation
Site – 32 Avenue
of the Americas

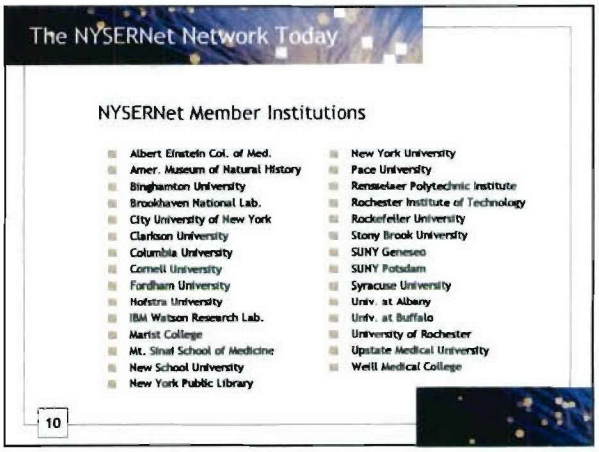
6

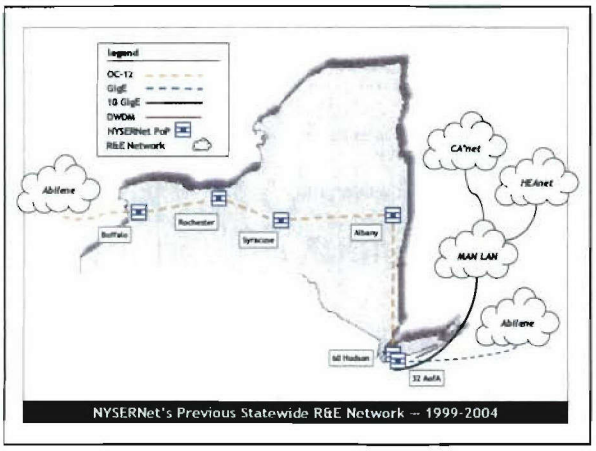
# Big Pipes, Emptying Pipes
# Tim Lance, NYSERNet

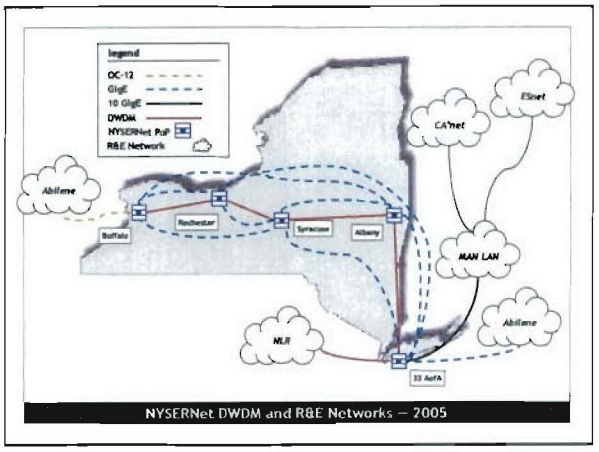




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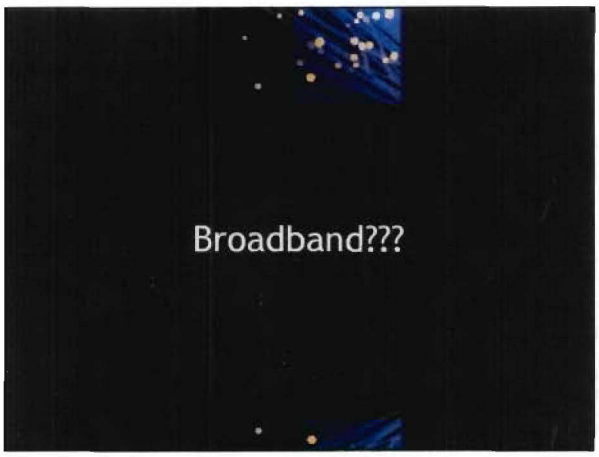


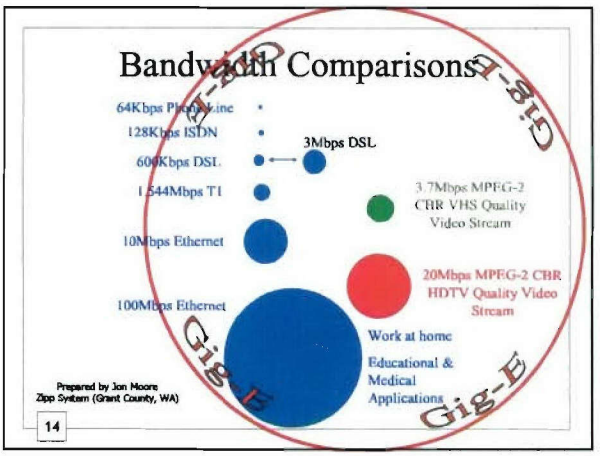


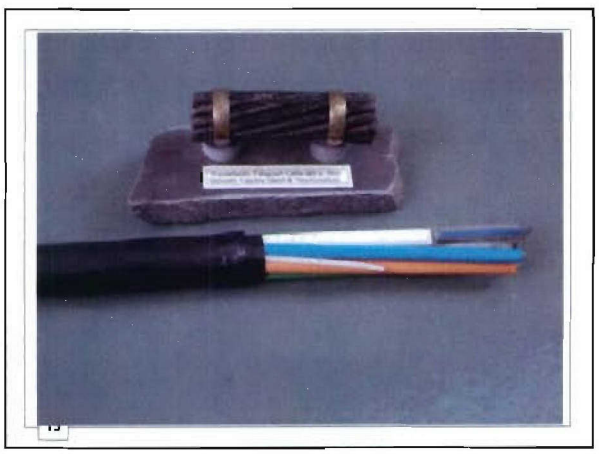

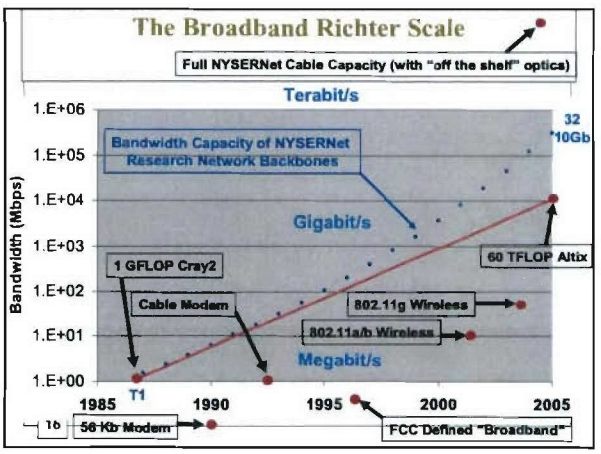



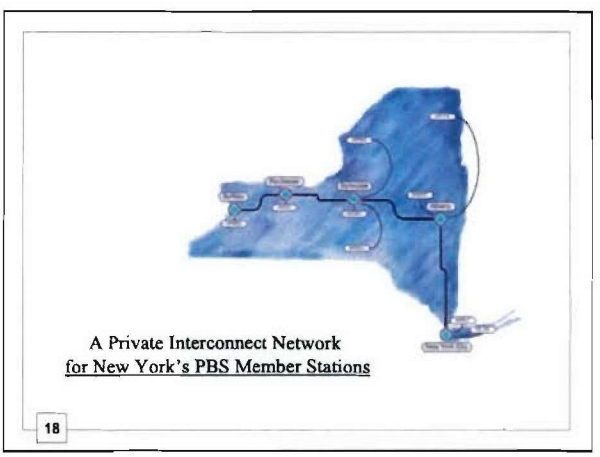

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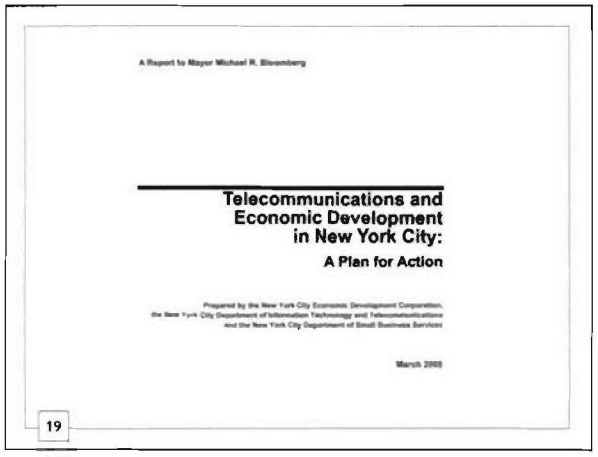
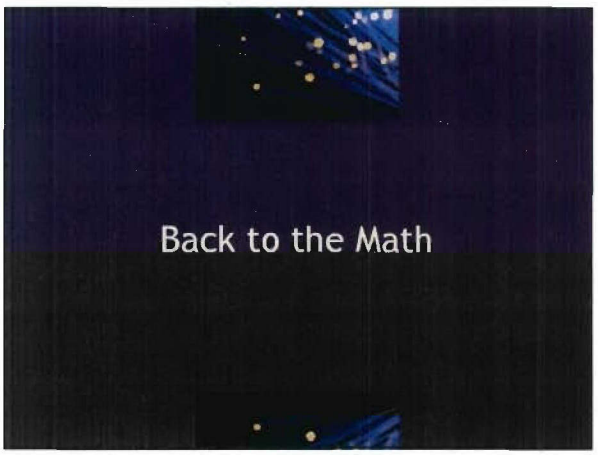
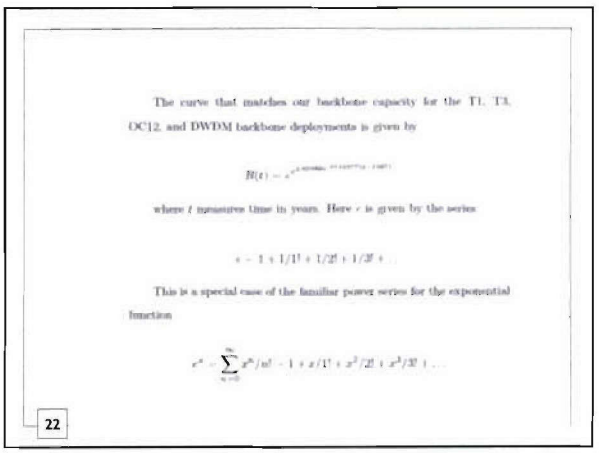


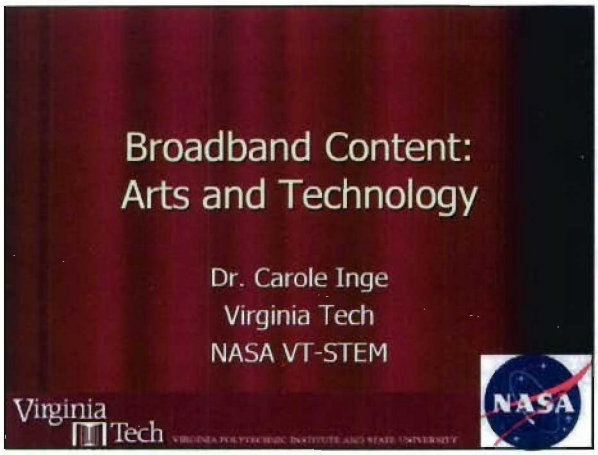


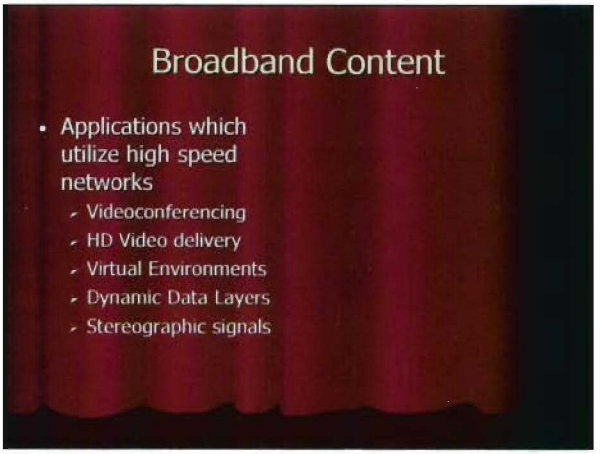


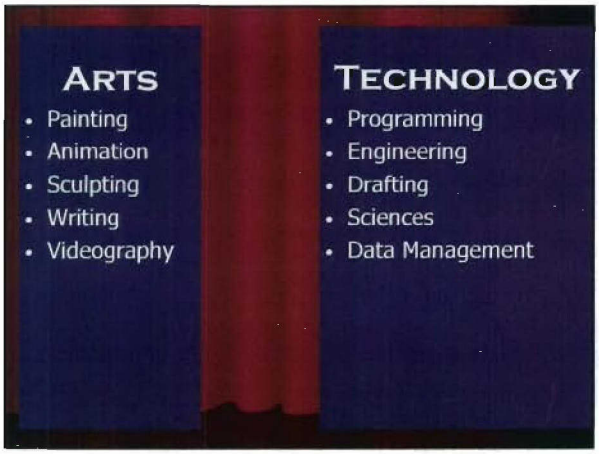




# Broadband Content: Arts and Technology

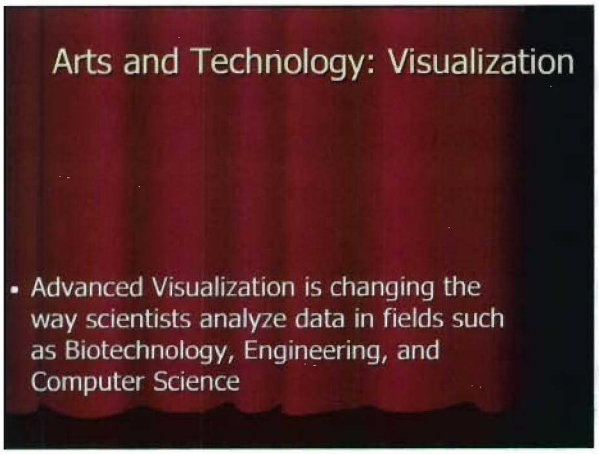
Mike Moore, Virginia Tech








# Broadband Content: Arts and Technology
## Mike Moore, Virginia Tech

### Arts Technology Influences

- Geospatial Technology and Engineering Industries
- Marketing and E-Commerce
- Electronic Entertainment

### Geospatial and Engineering

- Computational Science allows the analysis of exponentially increasing levels of data

### Marketing and E-Commerce

- Advertising is evolving to utilize the capabilities of the 3D Internet

### Electronic Entertainment

- EE applications represent some of the most realistic and lucrative virtual environments in existence

### Electronic Entertainment

- Electronic Arts is the fifth largest publicly owned software company in the US
- Yearly revenues : $3 Billion
- Larger than Apple and Pixar combined

### Electronic Entertainment

- Expectations are high as movies and game markets continue to merge

# Broadband Content: Arts and Technology
## Mike Moore, Virginia Tech

### Educational Impact?

- How will access to broadband content influence educational communities in years to come?

### Educational Impact: Distribution

- Broadband creates a new outlet to reach K-20 populations
  - Synchronous
    - Videoconferencing
  - Asynchronous
    - Streaming video
  - Real-time Interactivity
    - Dynamic Data Layers

### NASA Center for Distance Learning

- Based out of NASA VT-STEM program at Virginia Tech, NASA CDL produces five television and multimedia programs
  - NASA Live
  - KSNN
  - SCIFiles
  - Connect
  - Destination Tomorrow


### Riverstone Technology Park

- NASA VT-STEM will be located within Riverstone Technology Park Building One

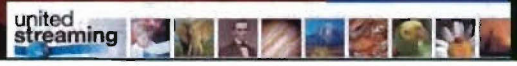
### Educational Impact: Commercial

- Commercial
  - Proliferation of Broadband networks create the opportunity for a new market for educational content

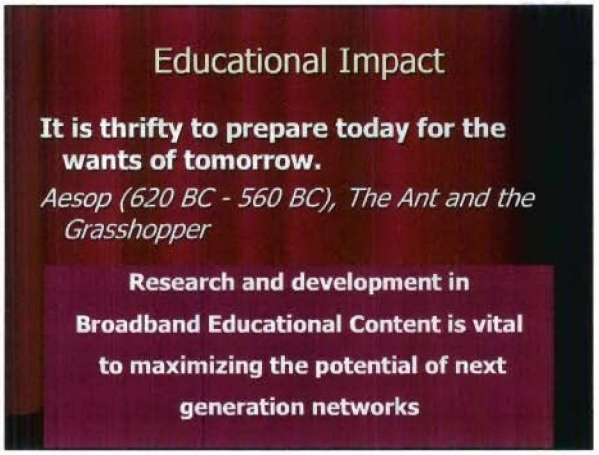
### Educational Impact: Evaluation

- Evaluation
  - Broadband access creates both new challenges and new opportunities for evaluation of educational content





# Broadband Content: Arts and Technology
Mike Moore, Virginia Tech



# The First Mile in Healthcare

NATIONAL LIBRARY OF MEDICINE

Michael J. Ackerman, Ph.D.
Assistant Director
High Performance Computing and Communications
National Library of Medicine

UNITED STATES
NLM National Library of Medicine

PubMed National Library of Medicine NLM

ClinicalTrials.gov

MEDLINEplus Health Information

SIS Specialized Information Services NLM

www.nlm.nih.gov

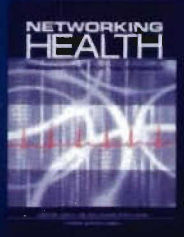
# NGI Agencies - 1996

- DARPA - Defense Advanced Research Projects Agency
- NSF - National Science Foundation
- DoE - Department of Energy
- NASA - National Aeronautics and Space Administration
- NIST - National Institute of Standards and Technology
- NLM - National Library of Medicine

# NGI and UCAID Goals

- Goal 1: Research:
  - Promote experimentation with the next generation of network technologies
- Goal 2: Network Testbeds:
  - Develop a next generation network testbed to connect universities and federal research institutions at rates that are sufficient to demonstrate new technologies and support future research
- Goal 3: Applications:
  - Demonstrate new applications that meet important national goals and missions

# Networking Health: Prescriptions for the Internet




A study by the:
U.S. National Research Council
Computer Science Technology Board
http://www.nap.edu/catalog/9750.html

NATIONAL LIBRARY OF MEDICINE

# QoS Features for Healthcare

- Bandwidth reservation
- Low latency
- Low jitter
- Variable priority
- Data Integrity
- Selectable loss rate
- Security

NATIONAL LIBRARY OF MEDICINE

## Home and Office Network Speeds

| | Speed (bps) | Text 80x25 (sec.) | Image 1000x750x24 (sec.) |
|---|---|---|---|
| 56k Modem | 56,000 | 0.3571 | 40.179 |
| ISDN | 128,000 | 0.1562 | 17.578 |
| DSL - incoming | 500,000 | 0.0400 | 4.500 |
| outgoing | 128,000 | 0.1562 | 17.578 |
| Cable - incoming | 750,000 | 0.0267 | 3.000 |
| outgoing | 128,000 | 0.1562 | 17.578 |
| Wi-Fi - 802.11b | 11,000,000 | 0.0018 | 0.205 |
| Ethernet | 100,000,000 | 0.0002 | 0.023 |

NATIONAL LIBRARY OF MEDICINE

## Need for NGN in Radiology

| | | |
|---|---|---|
| • Digital radiology of the chest | 200 mbits | 2 sec. |
| • Mammography | 1,600 mbits | 16 sec. |
| • MRI study | 2,000 mbits | 20 sec. |
| • Echo-cardiogram study | 40,000 mbits | 400 sec. (6min. 40 sec.) |

100 base-T Ethernet

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**Real-time Telemedicine:**
**sponsored by The National Institutes of Health**

NATIONAL LIBRARY OF MEDICINE

**Categories**

Medicine, Collaboration

**Vision**

Provide a means of remote medical consultations through the use of real-time analysis of medical diagnostic procedures involving motion.

**Why NGI?**

For accurate medical diagnosis, real-time telemedicine would require 75 Mbits/sec transmission speeds for video sequences such as echo-cardiography. In addition, latency must be maintained at a constant rate to prevent errors in diagnosis.

**Description**

Medical diagnosis is often based on the real-time observation and analysis of objects in motion. These situations tend to be in the realm of different medical specialists which are not conveniently available in many communities. Telemedicine consultations would be very useful and practical in these circumstances. Such situations might include orthopaedic gate analysis, monitoring nystagmus (vibrations of the eye) during a neurological examination, viewing the echo-cardiogram during a cardiology examination or looking through the endoscope during an endoscopy procedure.

## Baby CareLink

Beth Israel Deaconess Medical Center,
Boston, MA

NATIONAL LIBRARY OF MEDICINE

## Video house calls for patients with special needs

National Laboratory for the Study
of Rural Telemedicine,
University of Iowa, Iowa City, IA

NATIONAL LIBRARY OF MEDICINE

## Radiation Oncology Treatment Planning/Care Delivery Application

- Develop, implement, and evaluate NGI capabilities for radiation oncology treatment planning and care delivery.
- Application will provide diagnostic support, treatment planning, and remote verification of equipment from Cancer Center to a remote treatment facility.
- Focus on quality of service, security, privacy, and data integrity.

Johns Hopkins University Applied Physics Laboratory, Laurel, MD
Peninsula Regional Medical Center, Salisbury, MD

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JOHNS HOPKINS UNIVERSITY

## Remote, Real-time Simulation for Teaching Human Anatomy and Surgery

- Demonstrate remote, real-time teaching of human anatomy and surgery
- Deliver real-time simulation and visualization technologies
- Network-based architecture will allow for multiple high-resolution stereo-graphic displays and haptic devices

Stanford University
School of Medicine
Stanford, CA

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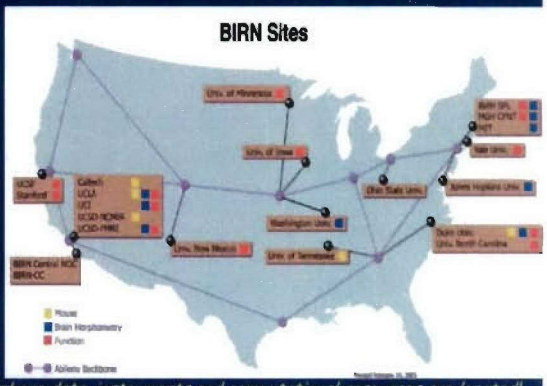
## What is the BIRN?

BIRN

*The BIOMEDICAL INFORMATICS RESEARCH NETWORK*

IT Infrastructure to hasten the derivation of new understanding and treatment of disease through use of distributed knowledge

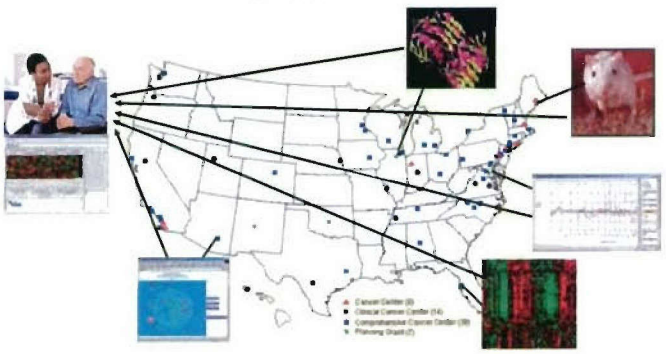
- A stable, robust, shared network and distributed database environment across >20 institutions, tailored to the BIRN collaborations.
- Extensible tools and IT infrastructure that can be reused.
- Established Cyber-infrastructure for a virtual data grid
- Involves a large scale data integration effort




*"It will no longer matter where data, instruments and computational resources are located!*

caBIG cancer Biomedical Informatics Grid

caBIG will facilitate sharing of infrastructure, applications, and data



## National Library of Medicine

www.nlm.nih.gov

U.S. ARMY MEDICAL RESEARCH & MATERIEL COMMAND

*BG Eric B. Schoomaker, Commanding*

*Deputy for Advanced Technologies*
**Colonel Jeffrey Roller, M.D., USAF**
*Director, Telemedicine & Advanced Technology Research Center (TATRC)*

**Research, Development & Rapid Prototyping**

*TATRC*

Telemedicine & Advanced Technology Research Center
*Cutting Edge Medical Technology*

U.S. ARMY MEDICAL RESEARCH & MATERIEL COMMAND

***Rapid Prototyping & Delivery Strategies***

**"Give Them....What They Want!"**

26 October 2005

## Briefing Sequence

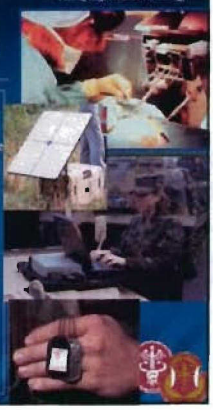
- Mission: Funding - Programs
- ICMEO: "Triple Helix Rapid Prototyping"
- Army's Greatest Inventions: "Chain of Custody" Analysis
- Military Health System CIO: Joint Medical Information System R&D Program Office
- Triple Helix Congressionals: CIMIT, CeMBR, HUI, T5, etc
- AAMTI: AMEDD Advanced Medical Technology Insertion Program
- MARP: Military Amputee Research Program
- Medical Logistics: Joint Medical Logistics R&D Program Office
- Deployments: Stryker, FDDMTF, 44th Med CMD

## Mission:

Funding - Programs

Telemedicine & Advanced Technology Research Center
*Cutting Edge Medical Technology*

## Telemedicine and Advanced Medical Technology Program



### Mission

**Apply physiological and medical knowledge, advanced diagnostics, simulations, and effector systems integrated with information and telecommunications for the purpose of enhancing operational and medical decision-making, improving medical training, and delivering medical treatment across all barriers.**

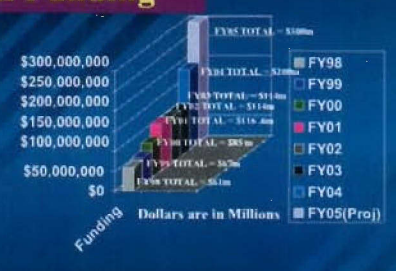
**The program scope is to identify, explore, and demonstrate key technologies and biomedical principles required to overcome technology barriers that are both medically and militarily unique.**

Department of Defense, Joint Warfighting Science and Technology Plan, Chapter IX, Joint Readiness and Logistics, 1999

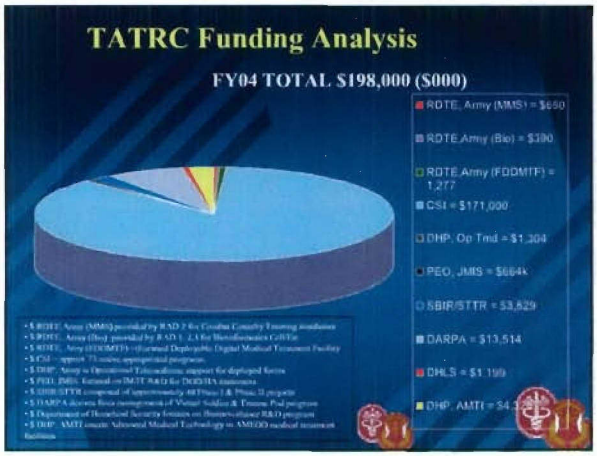
Telemedicine & Advanced Technology Research Center
*Cutting Edge Medical Technology*

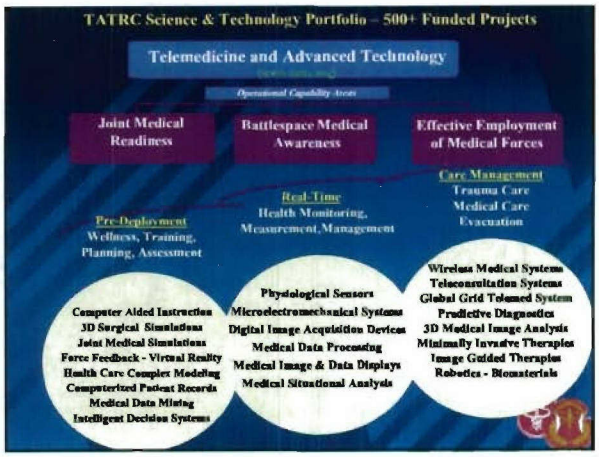
## Total Funding

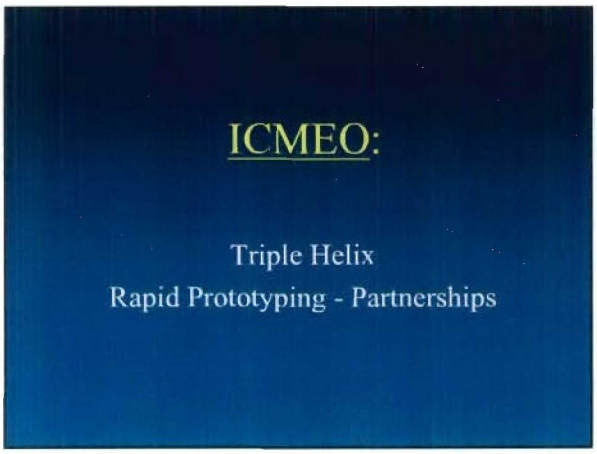
**Projected FY05 TOTAL = $300m**

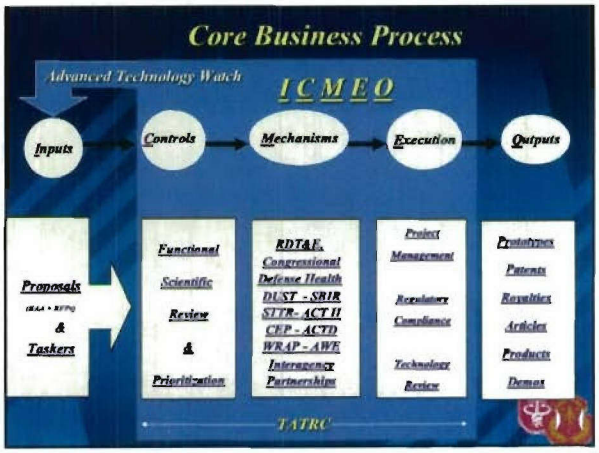


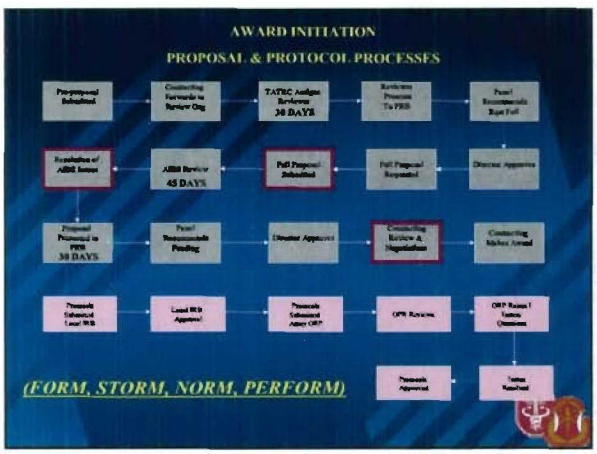

**Dollars are in Millions**


TATRC Funding Analysis
FY04 TOTAL $198,000 ($000)
RDTE, Army (MMS) = $650
RDTE,Army (Bio) = $390
RDTE,Army (FDDMTF) = 1,277
CSI = $171,000
DHP, Op Tmd = $1,304
PEO, JMIS = $664k
SBIR/STTR = $3,829
DARPA = $13,514
DHLS = $1,199
DHP, AMTI = $4,3

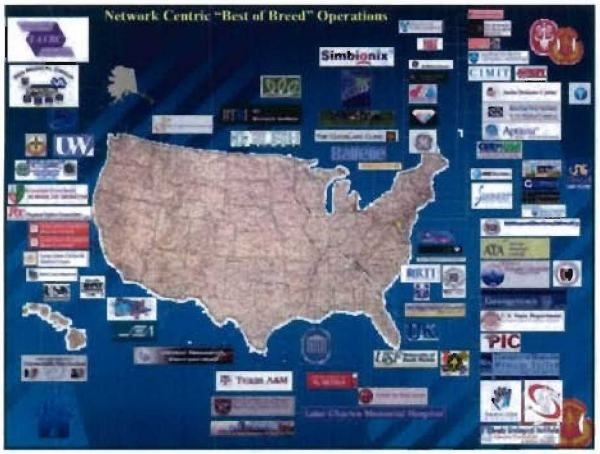

TATRC Science & Technology Portfolio – 500+ Funded Projects
Telemedicine and Advanced Technology
Joint Medical Readiness
Battlespace Medical Awareness
Effective Employment of Medical Forces
Pre-Deployment
Wellness, Training, Planning, Assessment
Real-Time
Health Monitoring, Measurement,Management
Care Management
Trauma Care
Medical Care
Evacuation
Computer Aided Instruction
3D Surgical Simulations
Joint Medical Simulations
Force Feedback - Virtual Reality
Health Care Complex Modeling
Computerized Patient Records
Medical Data Mining
Intelligent Decision Systems
Physiological Sensors
Microelectromechanical Systems
Digital Image Acquisition Devices
Medical Data Processing
Medical Image & Data Displays
Medical Situational Analysis
Wireless Medical Systems
Teleconsultation Systems
Global Grid Telemed System
Predictive Diagnostics
3D Medical Image Analysis
Minimally Invasive Therapies
Image Guided Therapies
Robotics - Biomaterials


ICMEO:
Triple Helix
Rapid Prototyping - Partnerships


Core Business Process
Advanced Technology Watch
ICMEO
Inputs
Controls
Mechanisms
Execution
Outputs
Proposals
&
Taskers
Functional
Scientific
Review
&
Prioritization
RDT&E,
Congressional
Defense Health
DUST - SBIR
STTR- ACT II
CEP - ACTD
WRAP - AWE
Interagency
Partnerships
Project
Management
Regulatory
Compliance
Technology
Review
Prototypes
Patents
Royalties
Articles
Products
Demos
TATRC


AWARD INITIATION
PROPOSAL & PROTOCOL PROCESSES
TATRC Assign Reviewer 30 DAYS
AHRB Review 45 DAYS
(FORM, STORM, NORM, PERFORM)


TATRC
LIFE CYCLE BUSINESS PRACTICES
TATRC manages projects through professional business processes
Integrated Research Team (IRT)
Program level
Periodic, as required
Broad strategic planning and oversight
Milestone Reviews
Project Level
Pre-Award
Establish performance metrics, deliverables and milestones
Integrated Product Team (IPT)
Project level
More frequent, scheduled
Project-specific guidance
Product Line Review (PLR)
Assessments of research by outside experts
One research category per month, annual cycle

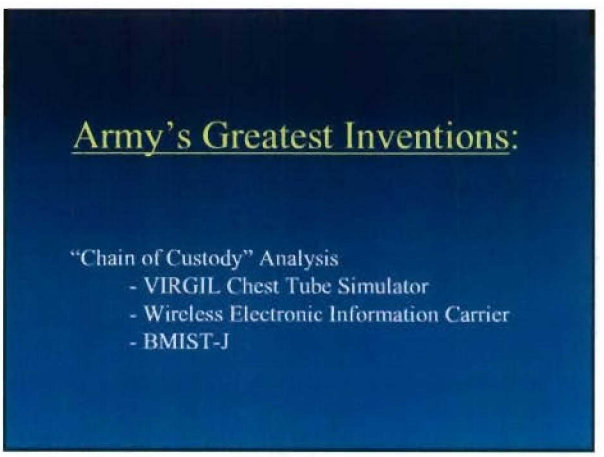

Network Centric "Best of Breed" Operations
Simbionix
UW
Texas A&M
PIC

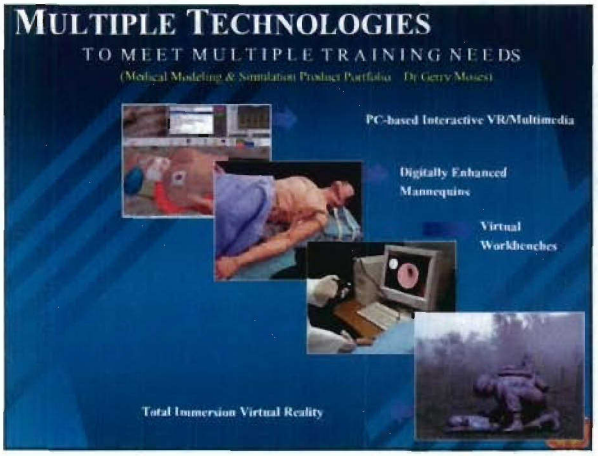

Leverage...
International Partnerships to Accelerate Development
US/Norway Telemedicine (Wireless, Handheld)
European Union Collaboration
NATO – Telemedicine Standardization Committee
Canada: International Space Station (Telesurgery)
South African Military Health Service (Peacekeeping)
Vietnam: Puresense Networked Water Sensor System
International Global Satellite System: Poland (CME)
Landmine Victim Assistance: Central America > Bosnia > Afghanistan
Partnership for Peace – Romanian Needs Assessment
Fellowship Programs: Pakistani, Polish
Yuma Proving Ground - Panama Telepathology – Hyperspectral Imaging
Argentina – Civilian Medical Emergency Response
Israeli Trauma Simulator
South Korean Exchange Program
ATA Symposiums: EU (2001) – Africa (2002) - Latin America (2003)
Eastern Europe (2004) – Asia (2005)

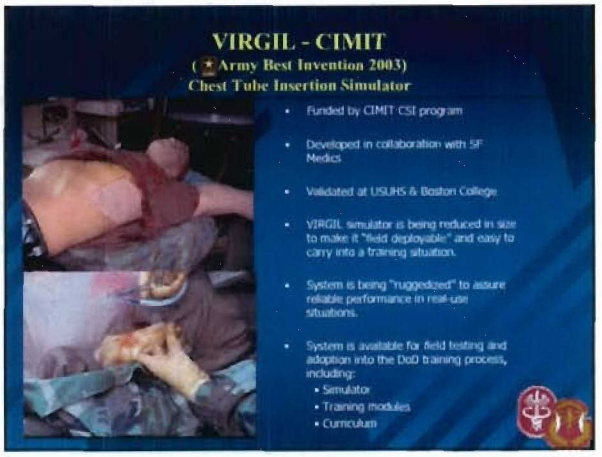

Triple Helix R&D Strategies
New Ideas, Knowledge
High Risk, High Payoff
Link to the Warfighter
DARPA
Academia + Government + Industry
(Maximum Bang for Buck)
Innovation, Transition
Expanded Resource Base

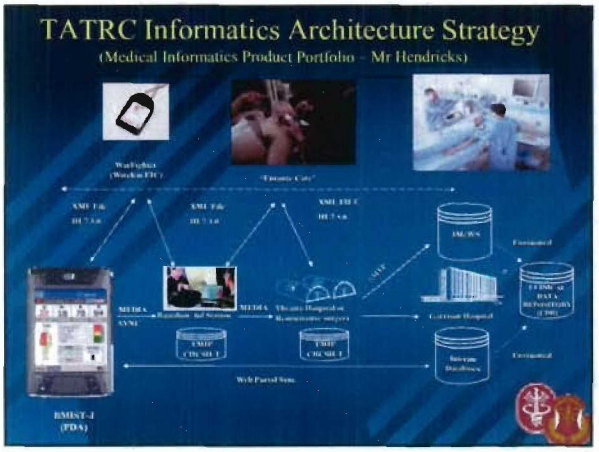

Examples of Recent TATRC Prototype Deliverables
BMIS-T
Chest Tube Simulator
Digital X-ray
Dreams Digital Ambulance
Smallpox Inoculation Training Unit
Medical Robotics
BRSS
STAT-Care
Retinal Imaging


The Chief of Staff Army's Guidance
(13 Aug 03)
•Rapidly Evaluate
•Feed Spiral Revisions
•Systemic Feedback
Current Force
EQUIP
ASSESS
INSERT
Future Force
•Warfighter Focus
•Rapid Implementation
•Evolving, Adaptive Enemy
•Concepts
•Threshold Technologies
•Surrogates
For the Army: (For the IFD-TF)
1. In Theater
2. Enroute To Theater
3. Transforming Units (3ID/101st)
Mission: Provide operational commanders with rapidly employable solutions to enhance lethality, survivability and force protection through implementation of COTS-GOTS (Equip) and Future Force technologies (Insert) while informing Army stakeholders (Assess) to remain ahead of an adaptive enemy.


Army's Greatest Inventions:
"Chain of Custody" Analysis
- VIRGIL Chest Tube Simulator
- Wireless Electronic Information Carrier
- BMIST-J

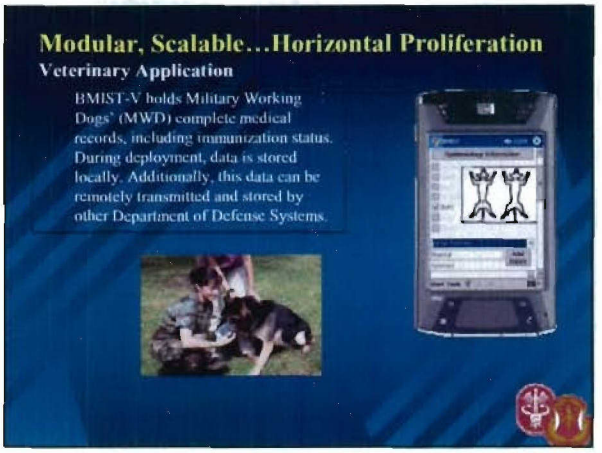

MULTIPLE TECHNOLOGIES
TO MEET MULTIPLE TRAINING NEEDS
(Medical Modeling & Simulation Product Portfolio - Dr Gerry Moses)
PC-based Interactive VR/Multimedia
Digitally Enhanced Mannequins
Virtual Workbenches
Total Immersion Virtual Reality


VIRGIL - CIMIT
(Army Best Invention 2003)
Chest Tube Insertion Simulator
Funded by CIMIT CSI program
Developed in collaboration with SF Medics
Validated at USUHS & Boston College
VIRGIL simulator is being reduced in size to make it "field deployable" and easy to carry into a training situation.
System is being "ruggedized" to assure reliable performance in real-use situations.
System is available for field testing and adoption into the DoD training process, including:
• Simulator
• Training modules
• Curriculum


TATRC Informatics Architecture Strategy
(Medical Informatics Product Portfolio – Mr Hendricks)
BMIST-J
(PDA)

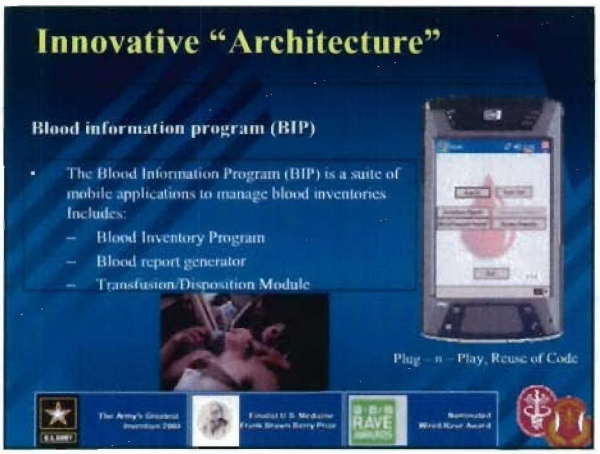

Wireless Electronic Information Carrier
"Electronic Dog Tag"
Complete electronic health record
Wireless electronic dog tag
Electronic dog tag
Army's Best
Invention 2004

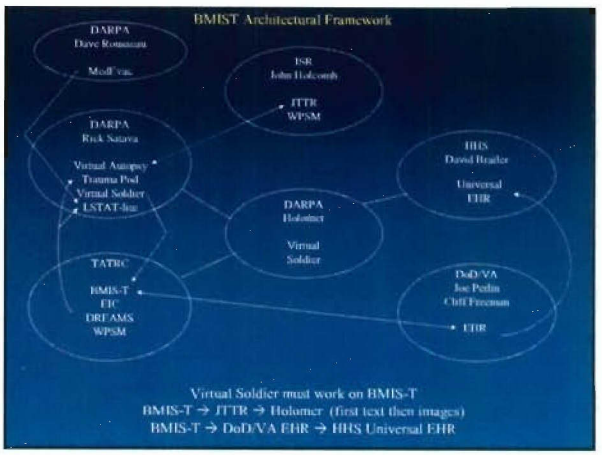

Battlefield Medical Information System Tactical
(BMIST-J)
Funded by NMTB CSI Program
Developed in collaboration:
SOCOM
Stryker Brigade
Suite of mobile applications
Empower providers via:
access to information,
decision support tools
electronic health record.
Synchronizes with Joint health surveillance and medical information systems

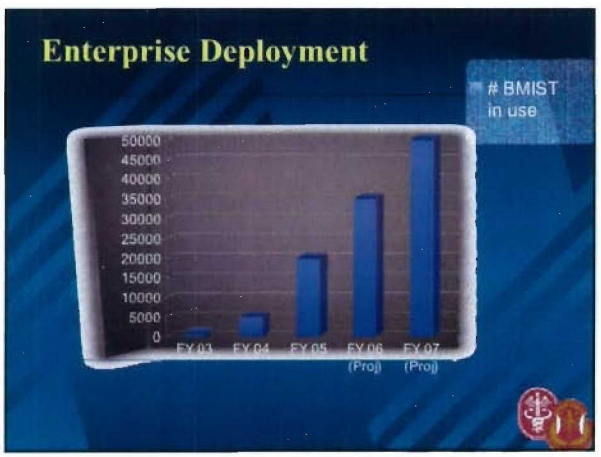

Modular, Scalable…Horizontal Proliferation
Veterinary Application
BMIST-V holds Military Working Dogs' (MWD) complete medical records, including immunization status. During deployment, data is stored locally. Additionally, this data can be remotely transmitted and stored by other Department of Defense Systems.

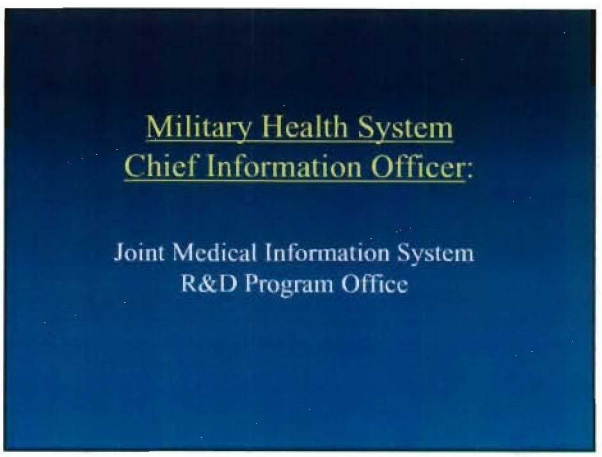

Pocket TRAVAX
(White House CRADA)
Pocket Travax is a handheld tool that allows users to to locate hospitals or clinic that can provide needed emergency services by country location or GPS coordinates
Providing travelers information for medical emergencies
Eventually provide dynamic/real-time local capabilities data

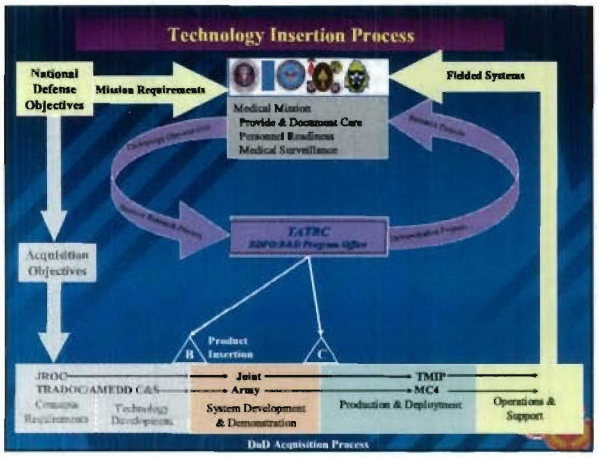

Wireless Sensors
(Commercial Partnership)
Multiple patient monitoring
Multimedia electronic health record
WelchAllyn

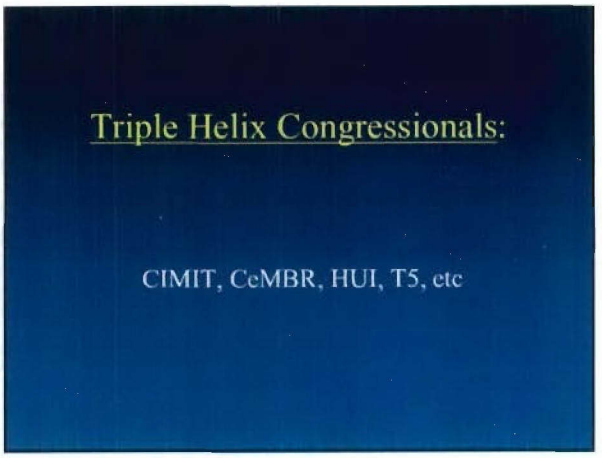

Innovative "Architecture"
Blood information program (BIP)
The Blood Information Program (BIP) is a suite of mobile applications to manage blood inventories
Includes:
Blood Inventory Program
Blood report generator
Transfusion/Disposition Module
Plug – n – Play, Reuse of Code

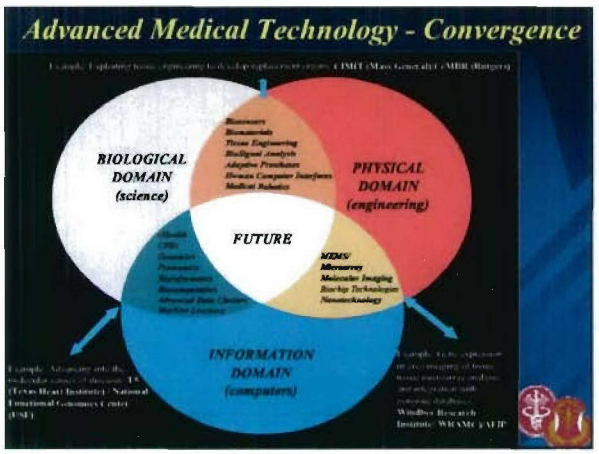

BMIST Architectural Framework
DARPA
Dave Rousseau
ISR
John Holcomb
JTTR
WPSM
DARPA
Rick Satava
Virtual Autopsy
Trauma Pod
Virtual Soldier
LSTAT-Iso
HHS
David Brailer
Universal
EHR
DARPA
Holomer
Virtual
Soldier
TATRC
BMIS-T
EIC
DREAMS
WPSM
DoD/VA
Joe Perlin
Cliff Freeman
EHR
Virtual Soldier must work on BMIS-T
BMIS-T → JTTR → Holomer (first text then images)
BMIS-T → DoD/VA EHR → HHS Universal EHR

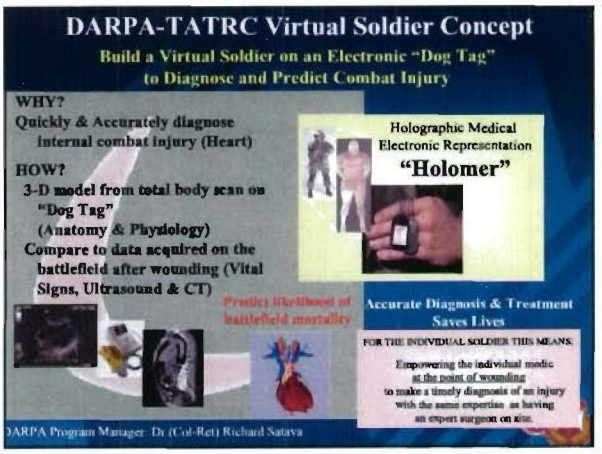

Enterprise Deployment
# BMIST
in use
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
FY 03
FY 04
FY 05
FY 06 (Proj)
FY 07 (Proj)

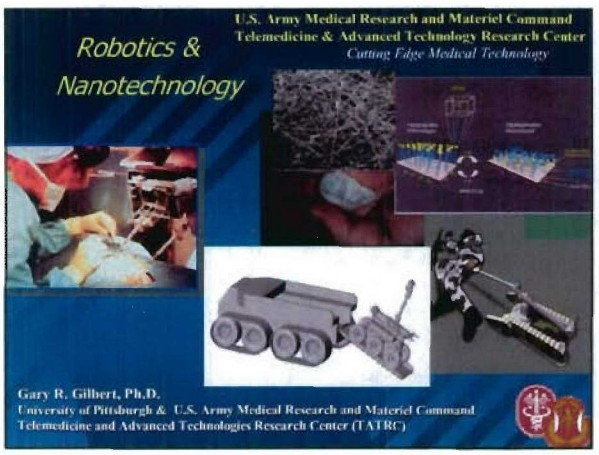

Military Health System
Chief Information Officer:
Joint Medical Information System
R&D Program Office

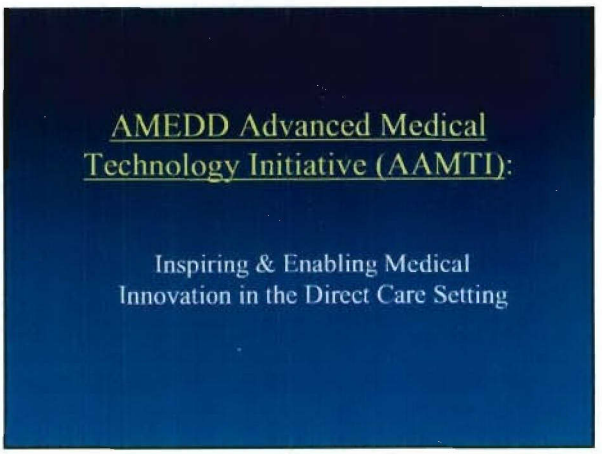

Technology Insertion Process
National Defense Objectives
Mission Requirements
Fielded Systems
Medical Mission
Provide & Document Care
Personnel Readiness
Medical Surveillance
TATRC
Acquisition Objectives
Product Insertion
B
C
JROC
TRADOC/AMEDD C&S
Joint
Army
TMIP
MC4
System Development & Demonstration
Production & Deployment
Operations & Support
DoD Acquisition Process


Triple Helix Congressionals:
CIMIT, CeMBR, HUI, T5, etc


Advanced Medical Technology - Convergence
BIOLOGICAL DOMAIN (science)
PHYSICAL DOMAIN (engineering)
FUTURE
INFORMATION DOMAIN (computers)


DARPA-TATRC Virtual Soldier Concept
Build a Virtual Soldier on an Electronic "Dog Tag"
to Diagnose and Predict Combat Injury
WHY?
Quickly & Accurately diagnose internal combat injury (Heart)
HOW?
3-D model from total body scan on "Dog Tag"
(Anatomy & Physiology)
Compare to data acquired on the battlefield after wounding (Vital Signs, Ultrasound & CT)
Holographic Medical Electronic Representation
"Holomer"
Predict likelihood of battlefield mortality
Accurate Diagnosis & Treatment Saves Lives
FOR THE INDIVIDUAL SOLDIER THIS MEANS:
Empowering the individual medic at the point of wounding to make a timely diagnosis of an injury with the same expertise as having an expert surgeon on site.
DARPA Program Manager: Dr (Col-Ret) Richard Satava


Robotics & Nanotechnology
U.S. Army Medical Research and Materiel Command
Telemedicine & Advanced Technology Research Center
Cutting Edge Medical Technology
Gary R. Gilbert, Ph.D.
University of Pittsburgh & U.S. Army Medical Research and Materiel Command
Telemedicine and Advanced Technologies Research Center (TATRC)


AMEDD Advanced Medical Technology Initiative (AAMTI):
Inspiring & Enabling Medical Innovation in the Direct Care Setting

## AAMTI Program

- Army Surgeon Funded
- Medical Technology Entrepreneurship
  - Reduce Cost, Increase Access, Improve Quality
- Successes:
  - AERO (Paperless Physical Exam)
  - Telepathology
  - Kiosks
  - Telemedicine Health
- Strategy
  - Competitively Fund "Best of Breed"
  - Demonstrate/Validate CSI, SBIR in AMEDD Setting
  - Inspire/Enable Development of New Generation of AMEDD Leaders

## MARP:
## Military Amputee Research Program

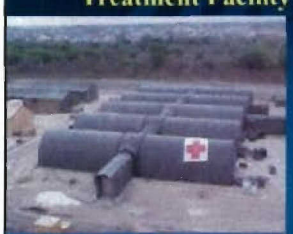
## Medical Logistics

## MARP

- Military Amputee Research Program (MARP) was formed at the Walter Reed Army Medical Center (WRAMC)
- FY04 CSL Sponsor: Rep. Bill Young, R-FL)
  - FY04: $3.5 M
  - FY05: $10 M
  - FY06: $10 M (est.)
- TATRC provides programmatic support and funding management for the MARP.
- TATRC and the MARP have identified five areas of prosthetic/amputee-related research focus:
  - Prosthetic Technology Advancement
  - Advancements in Rehabilitation Strategies
  - Advancements in Clinical Management
  - Epidemiological Studies
  - Database Development and Management
- To ensure best research MARP accepts intramural research proposals from WRAMC/DoD researchers, as well as extramural proposals
- Received 22 extramural pre-proposals
  - $30M in total submissions to date;
  - $11.5M in submissions currently being considered for funding.
- TATRC is also pursuing amputee-related research through the STTR and SBIR programs.
  - 3 Phase I STTR proposals have recently been awarded to address the Military Specific Prosthetic Design and Performance needs
  - Phase I SBIR topic addressing the needs for a Military Specific Prosthetic Shoulder System is now accepting proposal submissions
- TATRC has established a relationship with COL Gusti Ling, MD, Ph.D. at DARPA
  - Leverage research being performed through DARPA's 2 year and 4 year Advanced Prosthetics BAA projects.

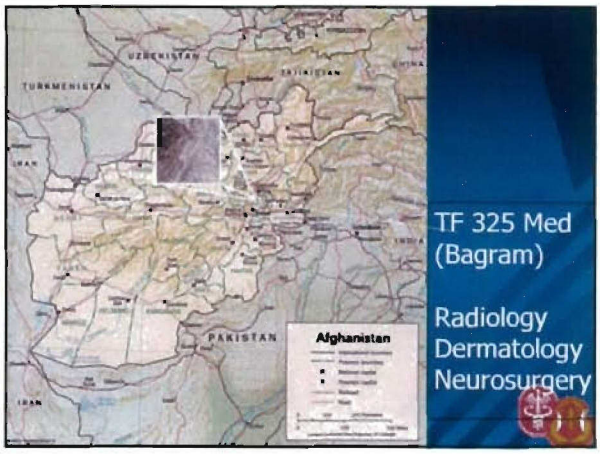
## DEPLOYMENTS

## Forward Deployable Digital Medical Treatment Facility (FDDMTF)



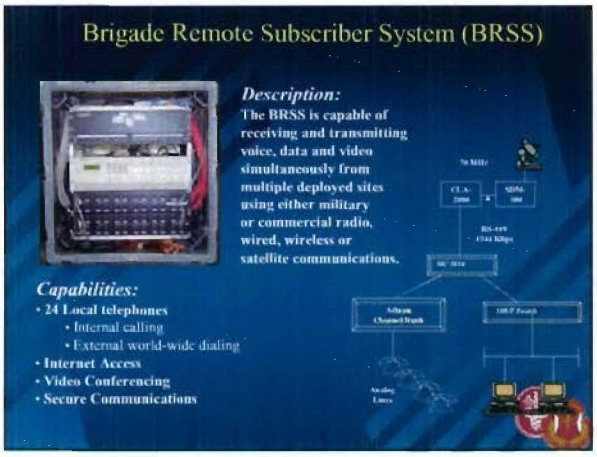
- **Item:** Forward deployable hospital interim to FMMS
- **Capability:** 0-44 bed, C130 rapidly deployable, digitized systems, leverages emerging lighter GOT/COTS technologies
- **Wgt. , cube, & Pwr:** < 1/3 DEPMEDS, FDECU
- **User(s):** FST & CSH Critical Care Holding for Unit of Action
- **Estimated Schedule:**
  - FDDMF Prototype FY02
  - FMSS Prototype FY04
  - Available for fielding FY08
- **FDA approval:**
- **Funding:** Congressional
- **SORC Supported:** Sustainability, Fo... Deployability, Il(1,2).

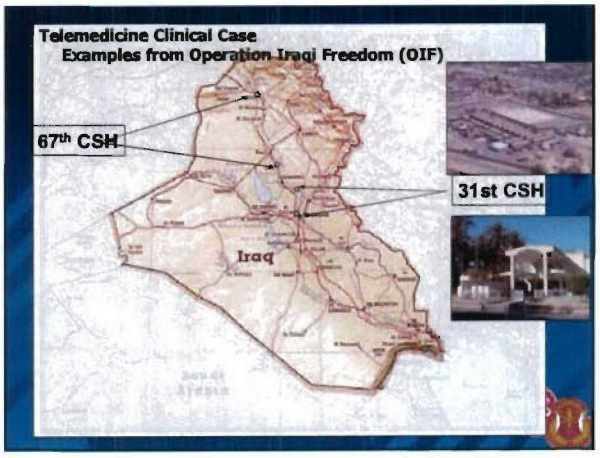
- **Patriot 05:** 7-22 July Air Force medical exercise, Volk Field, Wisconsin
- **Exercise Raven Wedge,** 6-18 August, Camp Fretterd, Maryland
- **Airport, Academia, Industry, Military and State Exercise (AAIMS)** 28 Oct – 3 Nov, Baltimore, Maryland Martin State Airport

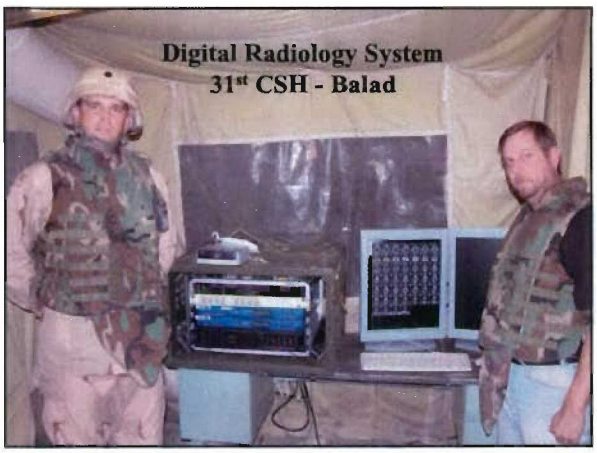


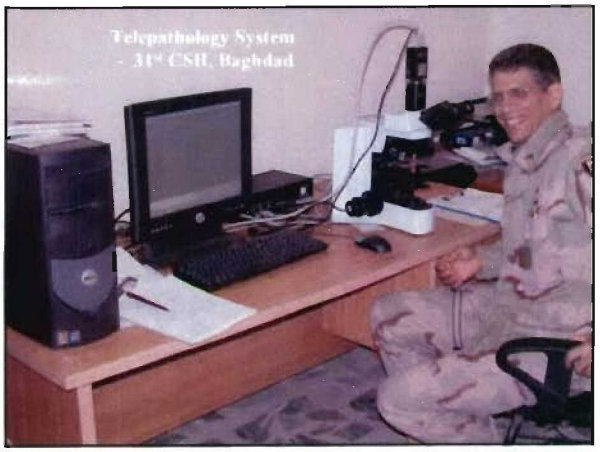

TF 325 Med (Bagram)

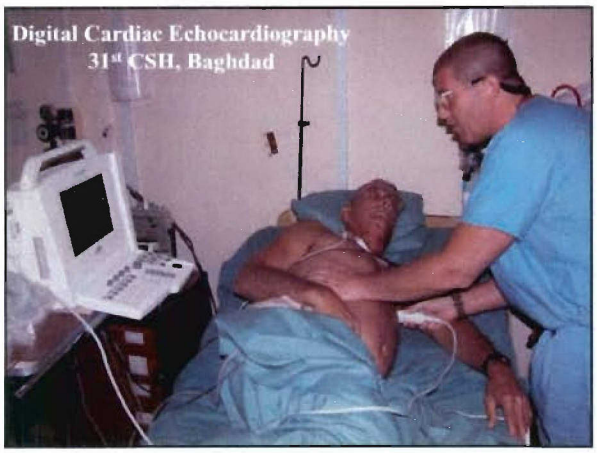
Radiology
Dermatology
Neurosurgery


Brigade Remote Subscriber System (BRSS)
Description:
The BRSS is capable of receiving and transmitting voice, data and video simultaneously from multiple deployed sites using either military or commercial radio, wired, wireless or satellite communications.
Capabilities:
• 24 Local telephones
• Internal calling
• External world-wide dialing
• Internet Access
• Video Conferencing
• Secure Communications


Telemedicine Clinical Case
Examples from Operation Iraqi Freedom (OIF)
67th CSH
31st CSH
Iraq

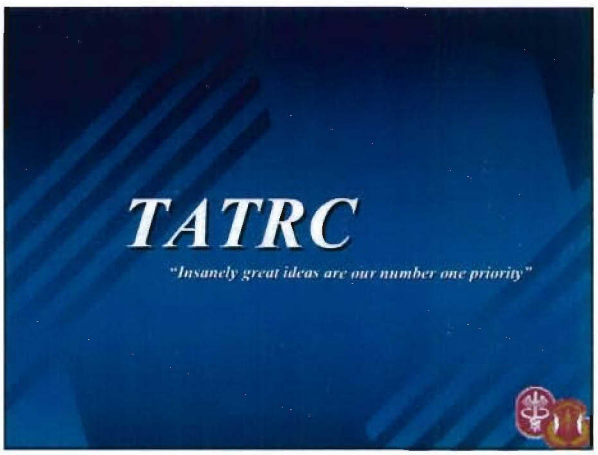

Digital Radiology System
31st CSH - Balad


Telepathology System
- 31st CSH, Baghdad

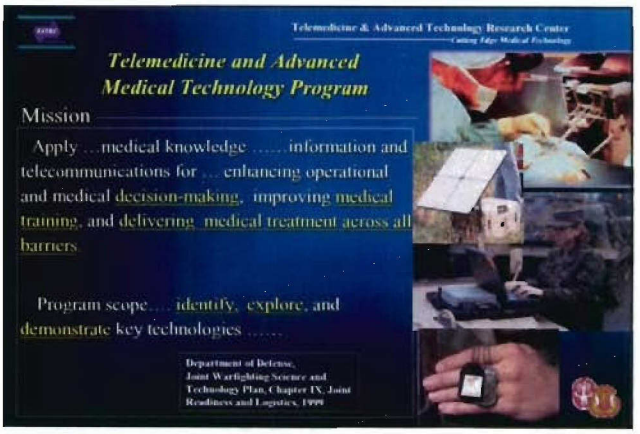

Digital Cardiac Echocardiography
31st CSH, Baghdad

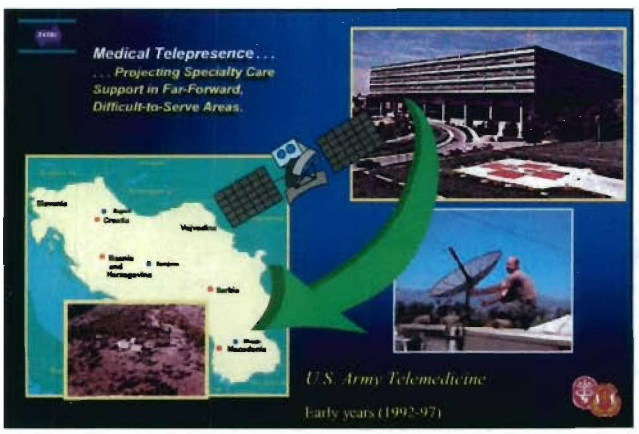

Teledentistry
31st CSH - Baghdad

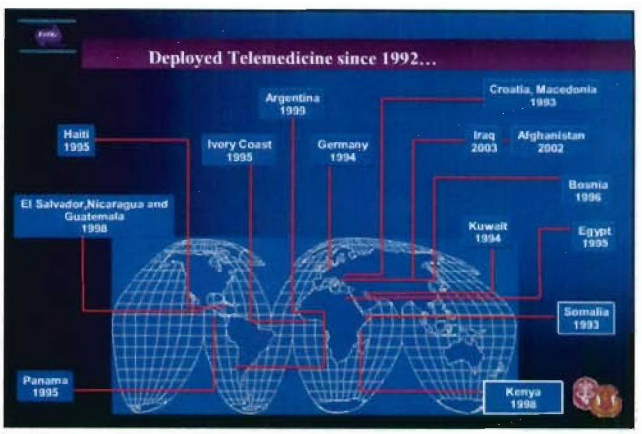

The Chief of Staff Army's Guidance
Future Force
EQUIP
ASSESS
INSERT
Current Force
• The nexus changes and advances over time
• True spiral development as solutions iterate
• Continuous evaluation and information to the Army
• Push future capabilities into the Force now


TATRC
"Insanely great ideas are our number one priority"

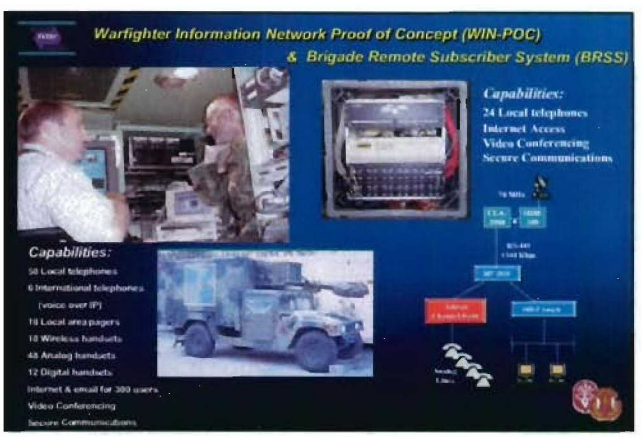
# Medical Informatics, Telemedicine, and Advanced Technology Research
## Gary Gilbert, TATRC

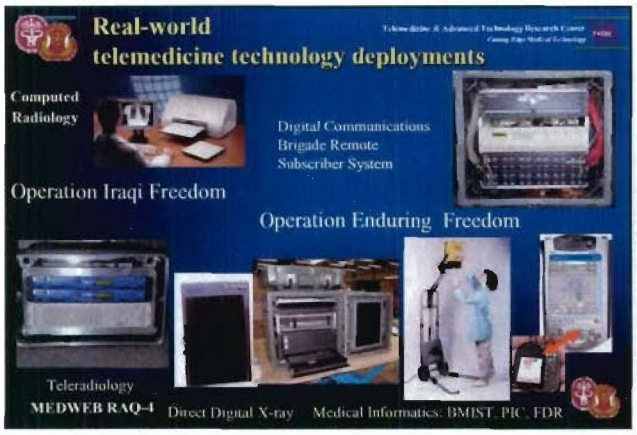



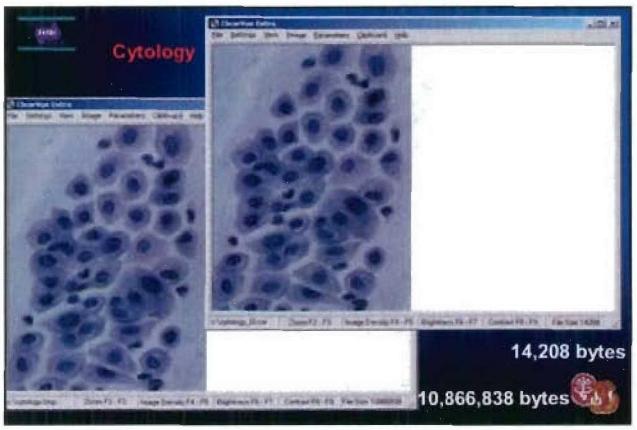


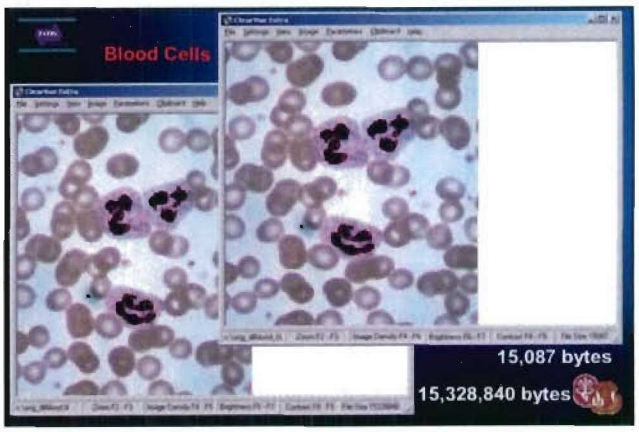


# Medical Informatics, Telemedicine, and Advanced Technology Research
## Gary Gilbert, TATRC

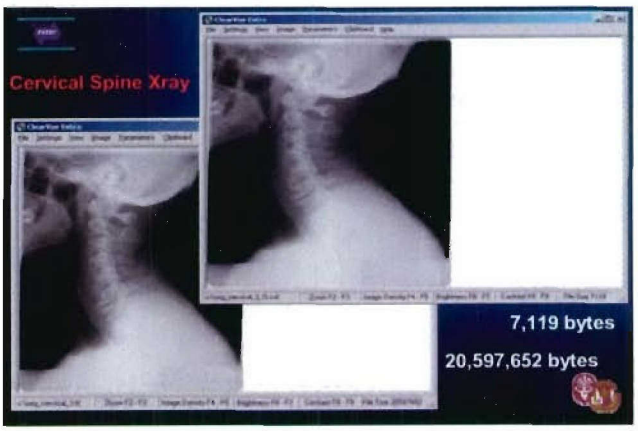




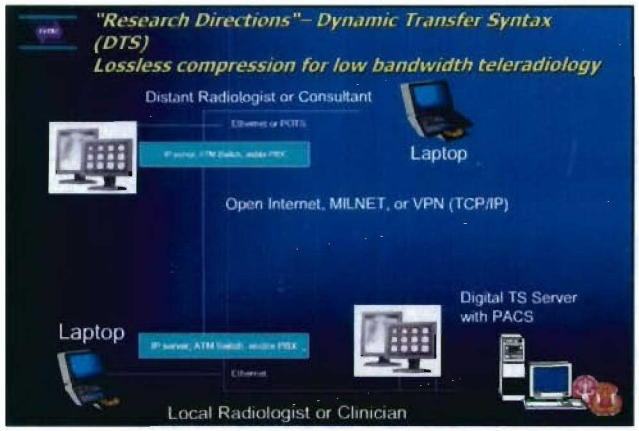


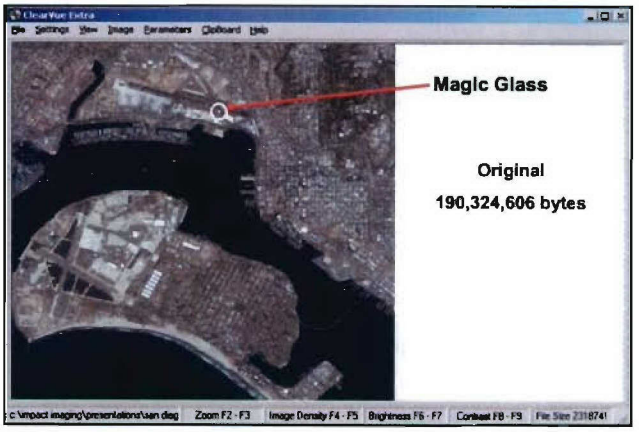



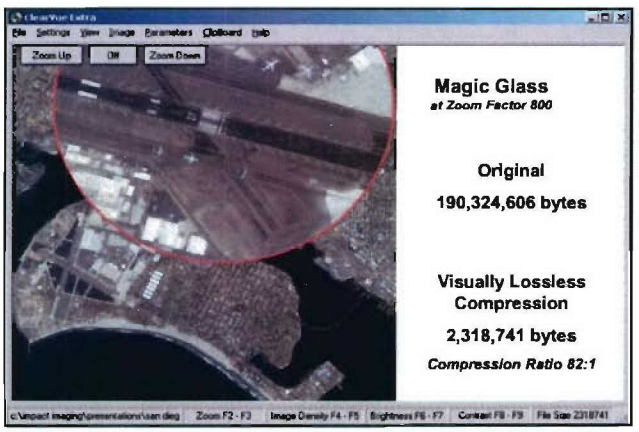


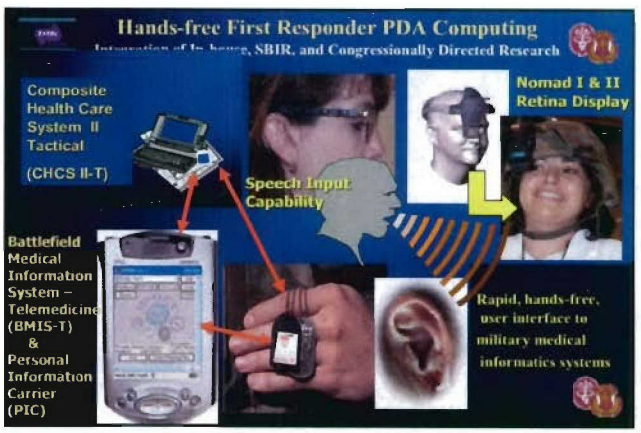


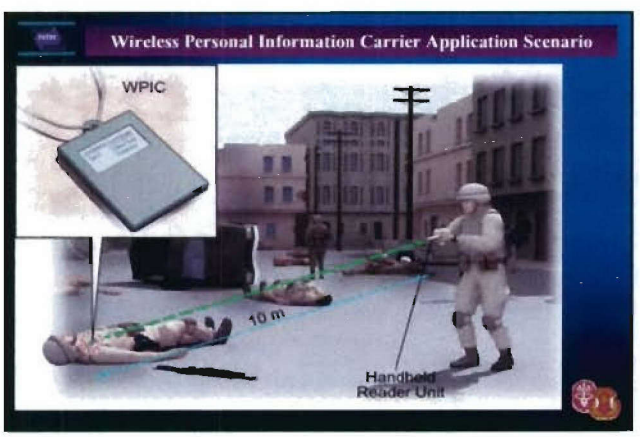
# Medical Informatics, Telemedicine, and Advanced Technology Research
## Gary Gilbert, TATRC

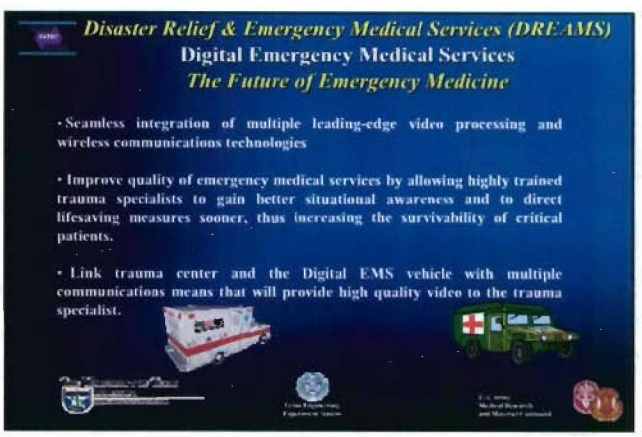


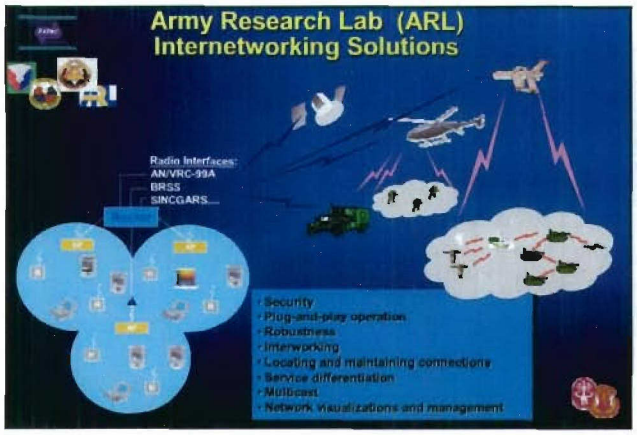



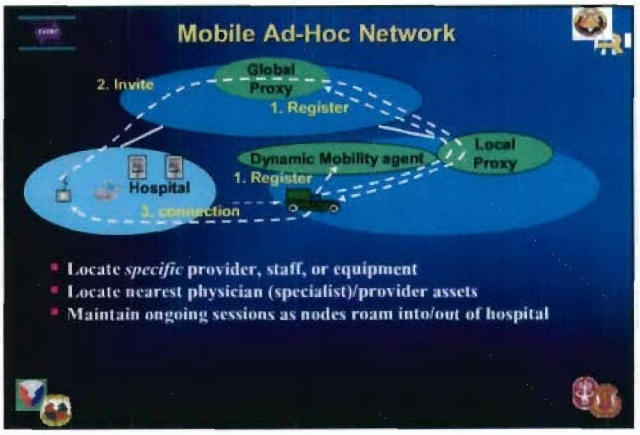



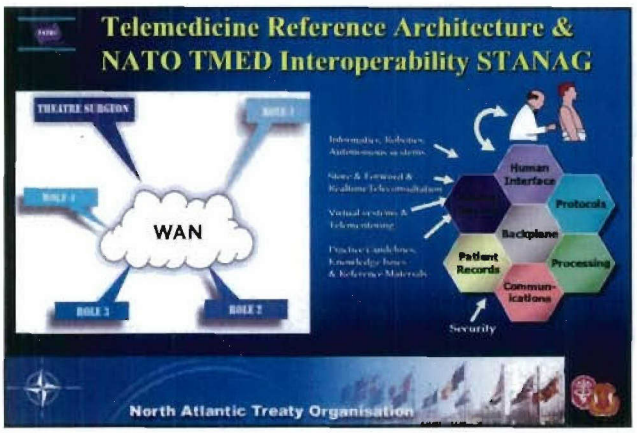



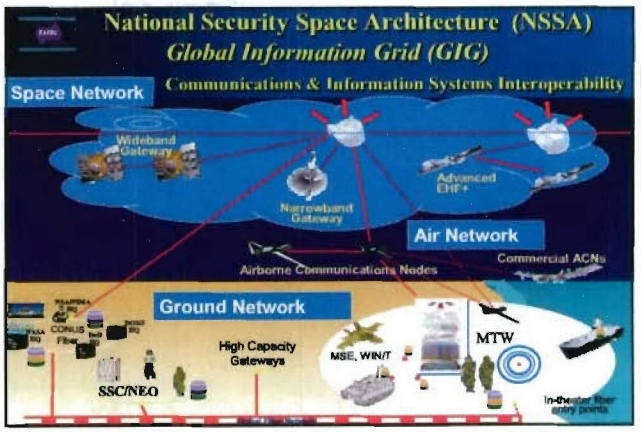



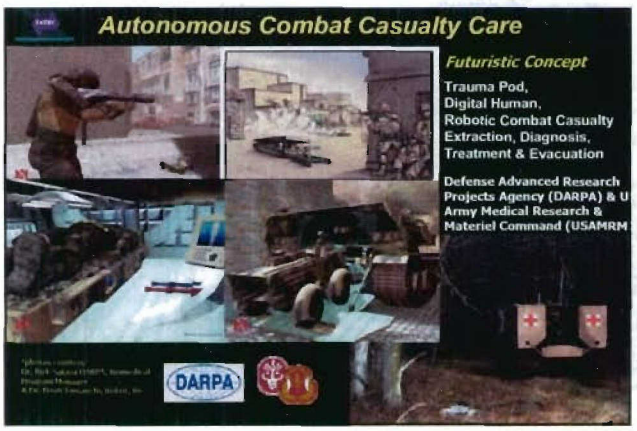



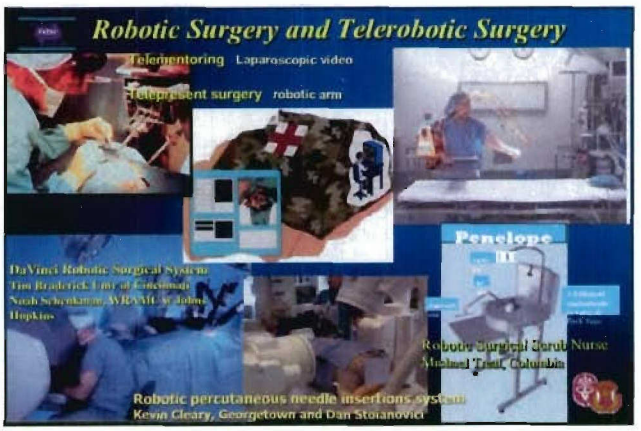

Army Research Lab (ARL)
Internetworking Solutions
Radio Interfaces:
AN/VRC-99A
BRSS
SINCGARS
Security
Plug-and-play operation
Robustness
Interworking
Locating and maintaining connections
Service differentiation
Multicast
Network visualizations and management

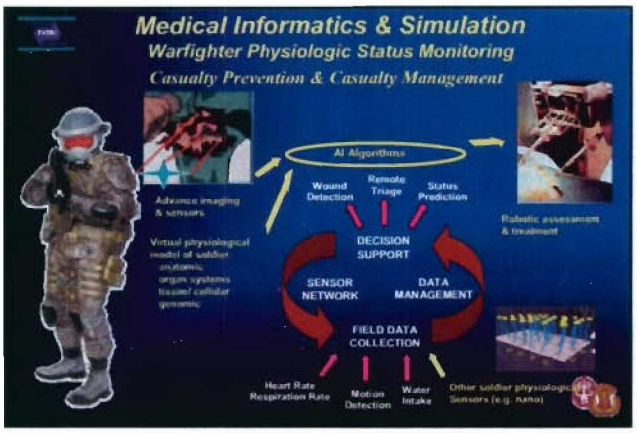

Mobile Ad-Hoc Network
2. Invite
Global Proxy
1. Register
Dynamic Mobility agent
1. Register
Local Proxy
Hospital
3. connection
Locate specific provider, staff, or equipment
Locate nearest physician (specialist)/provider assets
Maintain ongoing sessions as nodes roam into/out of hospital

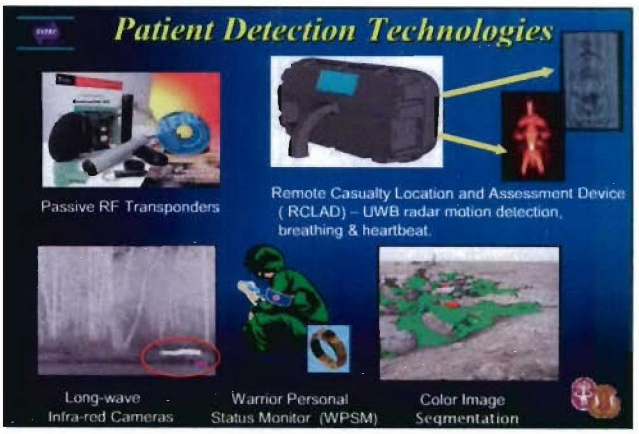

Telemedicine Reference Architecture &
NATO TMED Interoperability STANAG
THEATRE SURGEON
WAN
Human Interface
Protocols
Backplane
Patient Records
Processing
Communications
Security
North Atlantic Treaty Organisation

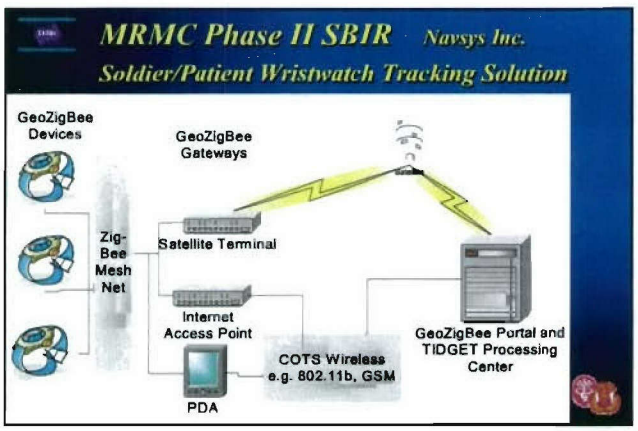

National Security Space Architecture (NSSA)
Global Information Grid (GIG)
Communications & Information Systems Interoperability
Space Network
Wideband Gateway
Narrowband Gateway
Advanced EHF+
Air Network
Airborne Communications Nodes
Commercial ACNs
Ground Network
High Capacity Gateways
MSE, WIN/T
MTW
SSC/NEO

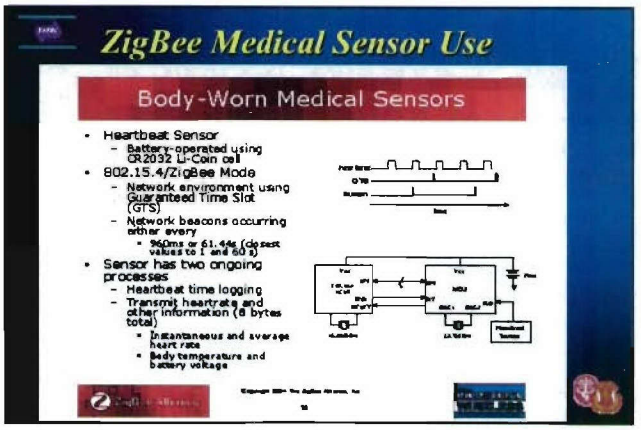

Autonomous Combat Casualty Care
Futuristic Concept
Trauma Pod,
Digital Human,
Robotic Combat Casualty Extraction, Diagnosis, Treatment & Evacuation
Defense Advanced Research Projects Agency (DARPA) & U
Army Medical Research & Materiel Command (USAMRM
DARPA

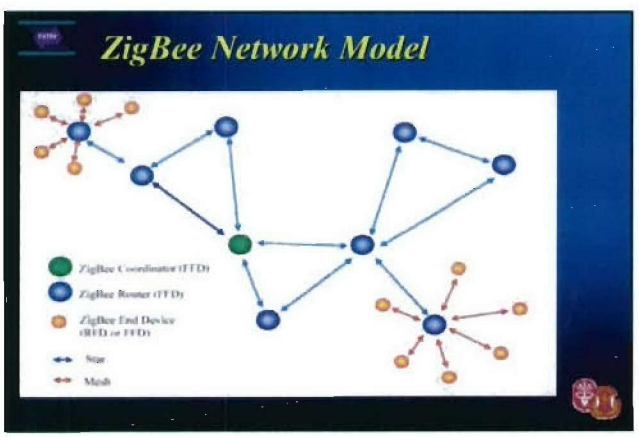

Robotic Surgery and Telerobotic Surgery
Telementoring Laparoscopic video
Telepresent surgery robotic arm
Penelope
DaVinci Robotic Surgical System
Robotic percutaneous needle insertions system
Kevin Cleary, Georgetown and Dan Stoianovici

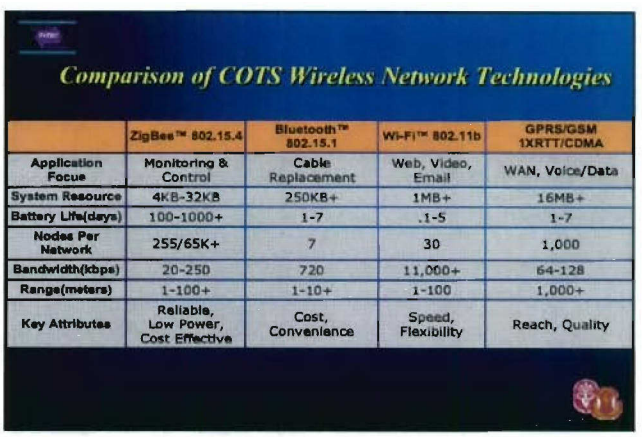


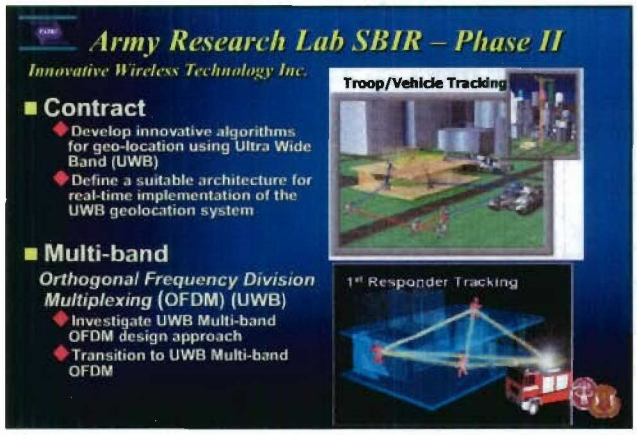



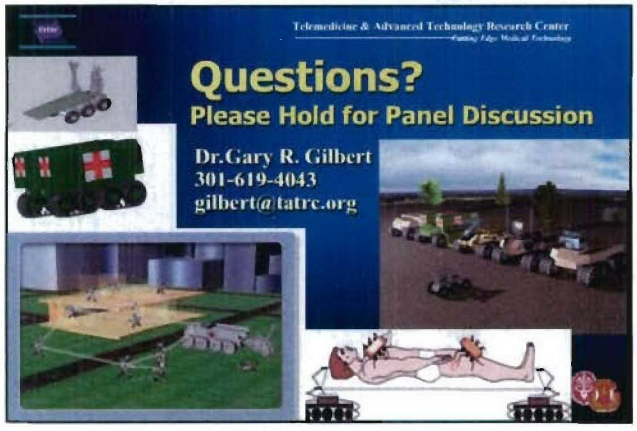

| | ZigBee™ 802.15.4 | Bluetooth™ 802.15.1 | Wi-Fi™ 802.11b | GPRS/GSM 1XRTT/CDMA |
|---|---|---|---|---|
| Application Focus | Monitoring & Control | Cable Replacement | Web, Video, Email | WAN, Voice/Data |
| System Resource | 4KB-32KB | 250KB+ | 1MB+ | 16MB+ |
| Battery Life(days) | 100-1000+ | 1-7 | .1-5 | 1-7 |
| Nodes Per Network | 255/65K+ | 7 | 30 | 1,000 |
| Bandwidth(kbps) | 20-250 | 720 | 11,000+ | 64-128 |
| Range(meters) | 1-100+ | 1-10+ | 1-100 | 1,000+ |
| Key Attributes | Reliable, Low Power, Cost Effective | Cost, Convenience | Speed, Flexibility | Reach, Quality |


Army Research Lab SBIR – Phase II
Innovative Wireless Technology Inc.
Contract
Develop innovative algorithms for geo-location using Ultra Wide Band (UWB)
Define a suitable architecture for real-time implementation of the UWB geolocation system
Multi-band
Orthogonal Frequency Division Multiplexing (OFDM) (UWB)
Investigate UWB Multi-band OFDM design approach
Transition to UWB Multi-band OFDM
Troop/Vehicle Tracking
1st Responder Tracking


ARL - USARMC/TATRC Phase II+ Contract
Integrated Wireless Technology Inc.
Soldier/First Responder/Casualty/Unmanned Vehicle Tracking


SBIR Phase II+ Contract
UWB Transceiver
Implement Secure UWB Communications Link with Forward Deployable Digital Medical Treatment Facility (FDDMTF)
Integrate UWB wireless communication node with prototype robotic patient rescue system developed by Applied Perception
Marsupial robotic vehicle pair incorporating teleoperation, semi-autonomous and autonomous control capabilities
Supports ad-hoc, mesh networking with indoor and outdoor geo-location capability


Saint Francis University
Center of Excellence for Remote and Medically Underserved Areas
Robotic Emergency Medicine and Danger-Detection (REMeD-D)


Telemedicine & Advanced Technology Research Center
Questions?
Please Hold for Panel Discussion
Dr.Gary R. Gilbert
301-619-4043
gilbert@tatrc.org

# A Few of My Favorite Gadgets
# Susan Estrada, FirstMile.US

## A Few of My Favorite Gadgets

Susan Estrada, President

susan@firstmile.us

firstmile.us
big broadband everywhere

## Why devices?

- New devices will make broadband
  - More compelling for many
  - Finally useful for others
  - Affordable for countless
  - Easy for the keyboard-challenged
  - And the list goes on....

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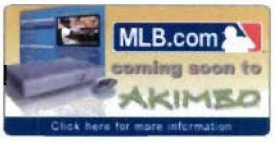
big broadband everywhere

## That's Entertainment

Location free TV

Playstation Portable

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## E-medicine - seniors health and well-being at home

- As the 77 million baby boomers age, there simply won't be enough medical professionals, money or health services to provide personal care for every condition. Imagine...
  - A wristwatch that can help find a wandering Alzheimer's patient
  - Smart Band-Aids that check your temperature and heartbeat
  - Sensors in bedsheets that monitor sleep apnea and snoring
  - RFID tags in pajamas

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## Live and Let Live

- "A patient in Houston can be whisked to a Level 1 trauma center inside 15 minutes; in Southwest Texas's Webb County, the trip might take two hours. This so frustrated Texas trauma surgeon James H. "Red" Duke that he developed a digital ambulance that lets doctors orchestrate treatment from the hospital. The Disaster Relief and Emergency Medical Services Interact ambulance transmits and receives vitals and video by switching among cellular, satellite and 802.11 networks. Vibrations, corners and overpasses cause most antennas to drop their connection, but this one keeps a tight lock even on twisty roads. Should a connection failure occur, error-correcting software in a pair of $73,000 modems reconstructs the missing bits. The system transmits patient information to the hospital, where ER docs see and hear everything through videoconferencing equipment and issue instructions to en route EMTs."

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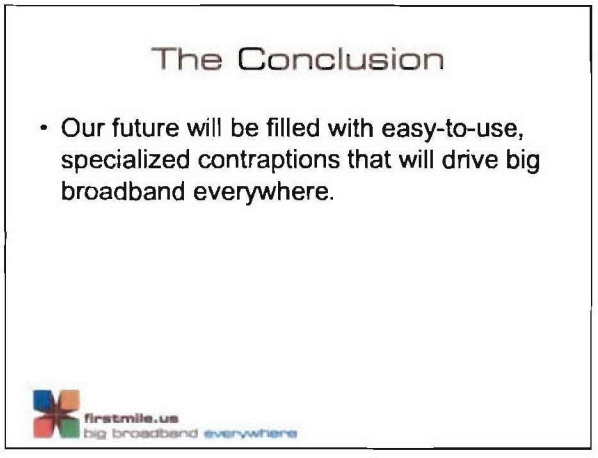
The Conclusion
• Our future will be filled with easy-to-use, specialized contraptions that will drive big broadband everywhere.
firstmile.us
big broadband everywhere

# Wi-Fi Arrives

- Everyone becomes a Broadcaster!

# Gadgets, Gizmos and The Next Big Thing

Dewayne Hendricks
Dandin Group

# Mesh Networking

- Alternative to 'star' architectures (Point to Multipoint)
- Example of peer to peer architecture
- Ad-hoc networking
- More advanced use in Europe due to different regulatory framework

# Opening Questions

- How many of you:
  - Own an HDTV?
  - Use Skype?
  - Are active bloggers?
  - Using an MP3 Player for Podcasting?
  - Own an XBox or Playstation 2?
  - Heard the term 'Darknet'?

# Meshcube

**meshcube available now!**

Welcome to the OpenSource distribution of the meshcube!

Due to the lively interest and the many requests for the meshcube we have decided to allow ordering as soon as possible. For this reason you can now order the meshcube here until we will have launched our webshop at meshcube.com.

Especially for communities we offer the meshcube as a kit which can easily be assembled. Prices start at 199,90 EUR. The kit comes without antennas to allow highest flexibility to the lowest possible price.

For those who want to start meshing right away this true linux-device can also be ordered readily assembled - prices starting at 239,90 EUR.

All prices for the assembled divice, for the kit and supplies can be found in the pricelist. To order, simply fill out the PDF-form and send it back (as fax or eMail) to 4G Systems GmbH.

# New Devices - New Rules

- The Tools Make the Rules
- 'Code is Law' Larry Lessig
- The rise of End-to-End or Peer to Peer
- Smart Radios
- Cognitive Radios

# The Internet

- Ten years now since the start of the commercial Internet (May, 1995)
- 'Same day service in a nanosecond world'
- The 'pioneers' get the arrows

# Sony PSP

- 4.3 in 16:9 480x272 screen
- USB, Memory Stick, Wi-Fi, UMD
- Game Platform; Adjunct to Sony PS3
- Video, Music, Pictures

# The Darknet

- Under the radar of most folks
- Consider it to be a collection of private address spaces (no Google here!)
- Accounts for between 60-80% of the total traffic of the global Internet (CacheLogic)
- Becoming more then just a medium to practice piracy

# Sony PSP

# New Content - New Rules

- Podcasting
- Vidcasting

## Daily Source Code

- http://www.dailysourcecode.com/

## Democracy Now

www.democracynow.org

## WGBH Morning Stories

- http://www.wgbh.org/morningstories

## Star Trek - New Voyages


## Rocketboom

www.rocketboom.com

## Second Life

- http://secondlife.com/

## Star Trek - Hidden Frontier

- http://www.hiddenfrontier.org/

## Dr. Who

- http://www.bbc.co.uk/doctorwho/

## Star Wreck

- http://www.starwreck.com/

## Star Wars - Revelations

- http://www.panicstruckpro.com/revelations/